

TA-F590ES/F690ES

SERVICE MANUAL

AEP Model
UK Model



Photo : TA-F690ES

SPECIFICATIONS

Amplifier Section

Items	Conditions	Data	
		TA-F590ES	TA-F690ES
Continuous RMS power output (both channels driven simultaneously)	4 ohms, 20 Hz – 20 kHz	Countries other than Scandinavian countries, Switzerland, Spain and Portugal 90 W + 90 W (THD 0.006%) (DIN: 105 W + 105 W)	110 W + 110 W (THD 0.01%) (DIN: 130 W + 130 W) 100 W + 100 W (THD 0.006%) (DIN: 110 W + 110 W)
	6 ohms, 20 Hz – 20 kHz	Scandinavian countries, Switzerland, Spain and Portugal 85 W + 85 W (THD 0.004%) (DIN: 95 W + 95 W)	125 W + 125 W (THD 0.01%) (DIN: 145 W + 145 W) 95 W + 95 W (THD 0.004%) (DIN: 105 W + 105 W)
	8 ohms, 20 Hz – 20 kHz	Countries other than Scandinavian countries, Switzerland, Spain and Portugal 80 W + 80 W (THD 0.004%) (DIN: 90 W + 90 W)	85 W + 85 W (THD 0.004%) (DIN: 95 W + 95 W)
Power band width (IHF)	8 ohms, THD 0.02%	10 Hz – 100 kHz at 45 W	10 Hz – 100 kHz at 45 W
Dynamic headroom ('78 IHF)	4 ohms	2 dB	2 dB
	8 ohms	1.2 dB	1.2 dB
Total harmonic distortion	8 ohms, at 10 watt output	0.005%	0.005%
Intermodulation (IM) distortion 60 Hz : 7 kHz = 4 : 1	4 ohms, at rated output	0.008%	0.008%
	6 ohms, at rated output	0.006%	0.006%
	8 ohms, at rated output	0.004%	0.004%
Damping factor	8 ohms, at 1 kHz	100	100

— continued on next page —

INTEGRATED STEREO AMPLIFIER
SONY®

Amplifier Section

Items	Conditions	Data	
		TA-F590ES	TA-F690ES
Residual noise	network A, 8 ohms	less than 100 μ V	less than 100 μ V
Frequency response	PHONO MM	RIAA equalization curve ± 0.2 dB	RIAA equalization curve ± 0.2 dB
	TUNER, CD, TAPE 1 2, DIRECT IN	2 Hz – 200 kHz $^{+0}_{-3}$ dB	2 Hz – 200 kHz $^{+0}_{-3}$ dB
Input sensitivity	PHONO	0.17 mV, 100 ohms	0.17 mV, 100 ohms
	MM	2.5 mV, 50 kilohms	2.5 mV, 50 kilohms
	TUNER, CD, DIRECT IN, TAPE 1 2, ADAPTOR, AUX	150 mV, 50 kilohms	150 mV, 50 kilohms
S/N (network) ('78 IHF)	PHONO	77 (0.5 mV)	77 (0.5 mV)
	MM	95 (5.0 mV)	95 (5.0 mV)
	TUNER, CD, DIRECT IN, TAPE 1 2, ADAPTOR, AUX	105 (150 mV)	105 (150 mV)
Output voltage impedance	REC OUT 1 2, ADAPTOR	150 mV, 1 kilohm	150 mV, 1 kilohm
	HEADPHONES	25 milliwatts (at 8 ohms) Accepts low and high impedance headphones.	25 milliwatts (at 8 ohms) Accepts low and high impedance headphones.
Tone controls	BASS, at 100 Hz	± 7 dB	± 7 dB
	TREBLE, at 10 kHz	± 6 dB	± 6 dB
Subsonic filter	—	6 dB / octave attenuation below 15 Hz	6 dB/octave attenuation below 15 Hz
Muting	—	−∞ dB	−∞ dB

General

System

Preamplifier section: Low-noise high gain NAB type equalizer amplifier, passive type direct tone control

Weight

TA-F590ES: Approx. 12 kg
(26 lbs 8 oz)

TA-F690ES: Approx. 12.5 kg
(27 lbs 8 oz)

Power requirements

Power amplifier section: Pure-complementary SEPP power amplifier, MOS FET power transistor for final stage
UK model: 240V AC, 50Hz
AEP, Germany models: 220 – 230V AC, 50/60Hz

Accessories supplied

Remote Commander RM-S703 (1)
(TA-F690ES)
RM-S702 (1)
(TA-F590ES)
Sony batteries SUM-3 (NS) (2)

Dimensions

TA-F590ES: Approx. 430 × 150 × 375 mm
(w/h/d)
(17 × 5 7/8 × 14 3/4 inches)
TA-F690ES: Approx. 430 × 150 × 375 mm
(w/h/d)
(17 × 5 7/8 × 14 3/4 inches)

Design and specifications are subject to change without notice.

Note

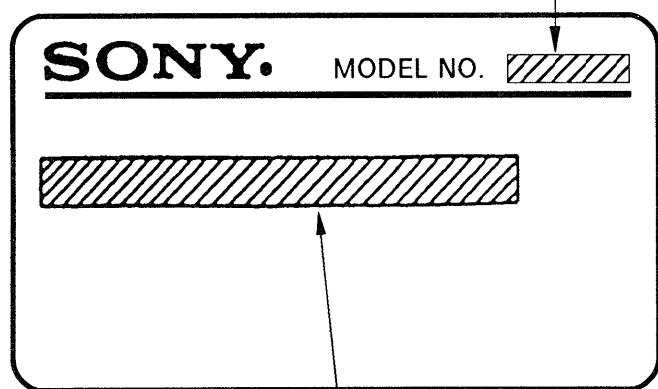
This appliance conforms with EEC directive 87/308/EEC regarding interference suppression.

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MODEL IDENTIFICATION

- Model Number Label -



AEP Model : AC 220 - 230V ~ 50/60Hz

Germany Model : AC 230V ~ 50/60Hz

UK Model : AC 240V ~ 50/60Hz

SAFETY-RELATED COMPONENT WARNING!!

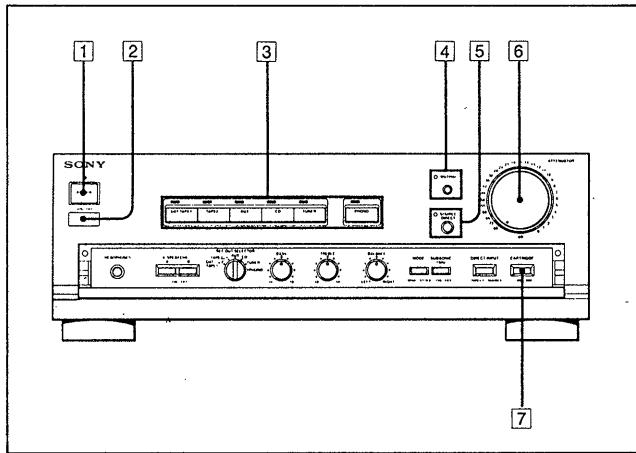
COMPONENTS IDENTIFIED BY MARK Δ OR DOTTED LINE WITH MARK Δ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

SECTION 1

GENERAL

This section is extracted from instruction manual

1-1. FUNCTION OF CONTROLS



Front panel

1 POWER switch and indicator

Turns the power on and off. After the power is turned on, the standby indicator lights red as the built-in muting circuit activates. When the amplifier is ready to operate, the indicator lights green. If the unit detects shorting in the speaker output circuits or in the DC component inputs, the indicator lights red. In this case, disconnect the power source and check the connected components and speaker systems.

2 Remote control sensor

3 INPUT SELECTOR

Selects the desired program source for listening.

4 MUTING button and indicator

Mutes the sound. Generally, keep the button released (OFF).

5 SOURCE DIRECT button and indicator

Deactivated the circuits of the TONE control, SUBSONIC filter button, BALANCE control and MODE selector without regard to the setting of the switches. The indicator lights red.

6 ATTENUATOR control

Adjusts the sound level. To increase the sound level, turn the control clockwise. To decrease the level, turn the control counterclockwise.

Caution

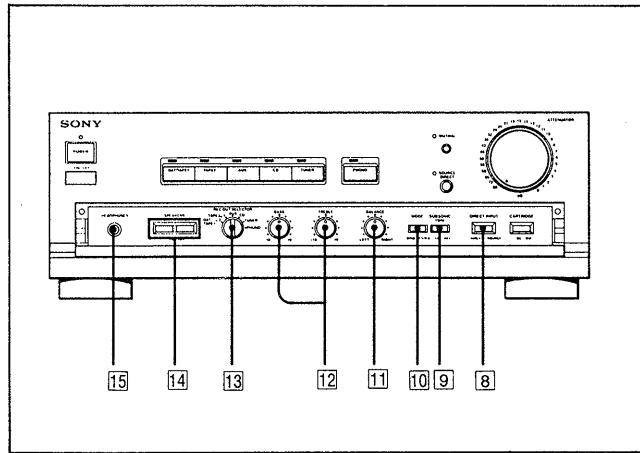
Turn down the sound level before switching on the unit. This prevents damage to speakers.

7 CARTRIDGE selector

Selects a position according to your cartridge.

MM: For moving-magnet type cartridges

MC: For moving-coil type cartridges



8 DIRECT INPUT selector

Selects the program source connected to the DIRECT IN jacks or the other input jacks.

DIRECT: For listening to a program source connected to the DIRECT IN jacks.

SOURCE: For listening to a program source connected to the other input jacks or the ADAPTOR jacks, such as a graphic equalizer.

9 SUBSONIC filter button

Reduces the noise components of less than 15 Hz which cause modulation noise.

10 MODE selector

STEREO: For listening to a stereo program.
MONO: For listening to a monaural program.

11 BALANCE control

Adjusts the sound level of the left and right speakers.

12 BASS and TREBLE TONE controls

Adjusts the tone quality.
To increase bass or treble sound, turn the control clockwise. To decrease them, turn the control counterclockwise.

13 REC OUT SELECTOR

Selects the program source for the REC OUT jacks.

14 SPEAKERS buttons

Select speaker system A or B, or both.
To drive speaker system A: Depress A button.

To drive speaker system B: Depress B button.

To drive speaker system A and B: Depress A and B.

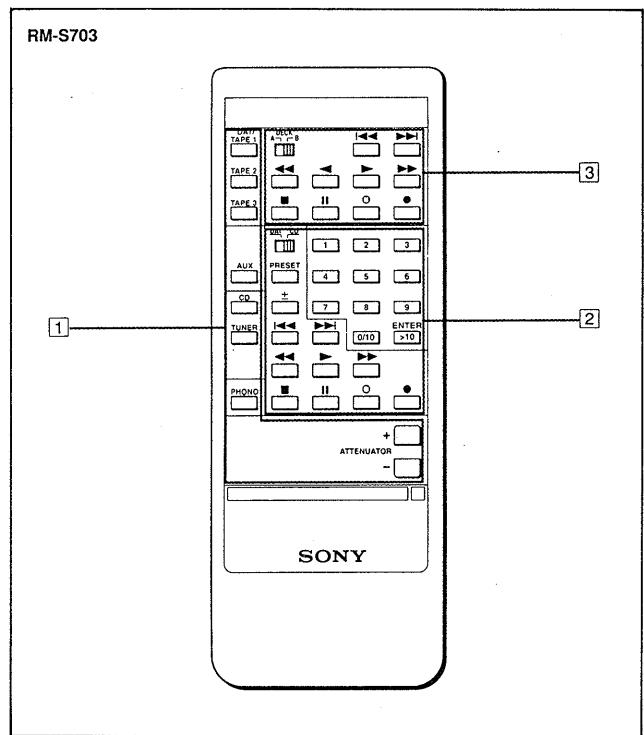
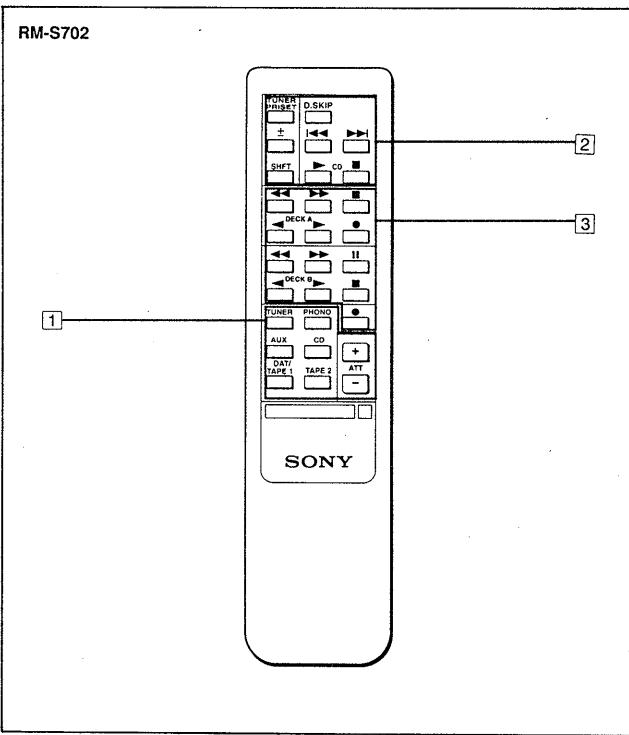
For headphones listening only: Set both to OFF (⊥).

TA-F690ES only

To use power amplifier or active speaker system connected to the PRE OUT jacks, depress B/PRE OUT.

15 HEADPHONES jack

Accepts headphones with the stereo phone plug.



**Remote Commander RM-S702
(for TA-F590ES)**

[1] Amplifier control section

Input selectors: Select an input source for the amplifier.
ATT. +/- buttons: Control the volume of the amplifier.

[2] Tuner/CD player control section

PRESET +/- buttons: Select a preset tuner channel. (for the tuner only)
SHIFT: Select the preset memory page A, B, or C. (for the tuner only)
D.SKIP: Move to the disc tray next to the current one. (for the CD player only)
◀◀/▶▶ : Locate a desired selection
▶ : Play
■ : Stop

[3] Tape deck control section

DECK A,B
◀◀/▶▶ : Fast winding
◀/▶ : Play
■ : Stop
● : Recording
DECK B only
■ : Pause

**Remote Commander RM-S703
(for TA-F690ES)**

[1] Amplifier control section

Input selectors: Select an input source for the amplifier.
ATTENUATOR +/- buttons: Control the volume of the amplifier.

[2] Tuner/DAT deck/CD player control section

DAT/CD selector: Select DAT deck or CD player.
◀◀/▶▶ : Locate a desired selection
◀◀/▶▶ : Manual search
▶ : Play
■ : Stop
■ : Pause
○ : Record muting
● : Recording
PRESET +/- buttons: Select a preset tuner channel. (for the tuner only)
Program number (1 to 0/10, and >10) button: Select a program or track number. (for the DAT deck and CD player)
ENTER buttons: Program your selection number. (for the DAT deck only)

[3] Tape deck control section

DECK A/B selector: Select deck A or B.
◀◀/▶▶ : Locate a desired selection.
◀/▶ : Play
◀◀/▶▶ : Fast winding
■ : Stop
■ : Pause
○ : Record muting
● : Recording

Note

The TAPE 3 button on the remote commander does not control this amplifier, as it doesn't have TAPE 3 input plugs.

SECTION 2

ELECTRICAL ADJUSTMENTS

Bias Adjustment

Note : Adjustment the idling after tuning the unit on for about 10 minutes, giving it time to warm up.

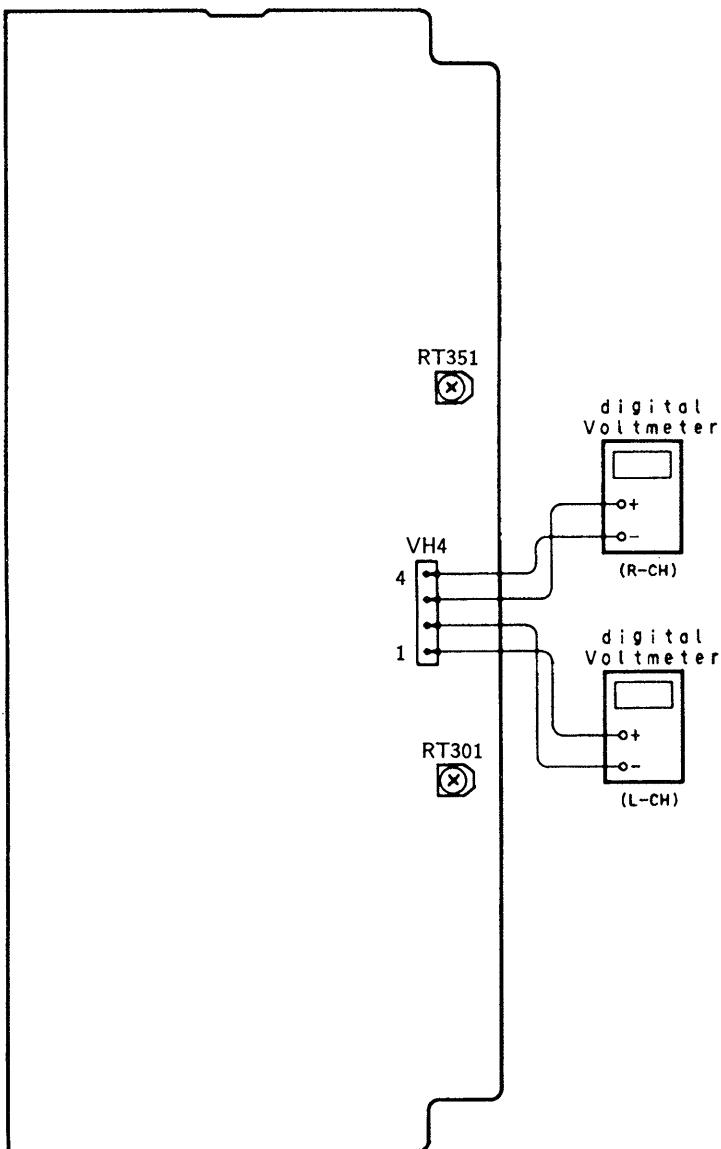
Procedure :

1. Connect the digital voltmeter to VH4 on main board as follows.
2. Adjust RT301(L-CH) and RT351(R-CH) so that the digital voltmeter on signal reads 24mV at VH4.

Adjustment Location :

【MAIN BOARD】

— COMPONENT SIDE —



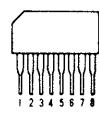
SECTION 3 DIAGRAMS

3-1. IC803 SYSTEM CONTROLLER (M 50720-358SP)

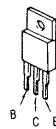
Pin No.	Pin Name	I/O	Description
1	5V CHECK	I	Power supply (+5V) check.
2	S/D ON/OFF	I	+5V power supply.
3	PROTECT	I	Ground.
4	X OUT	O	Connected oscillator circuit.
5	X IN	I	Connected oscillator circuit.
6	CE	I	Signal input for a return to normal position.
7	RESET	I	Reset signal input. ("L" : RESET)
8	VDD	I	+5 Volts power supply.
9	CNTR	I	Ground.
10	AC DET	I	Ground.
11	C	I	Connected 0.01 μ F capacitor.
12	VOL UP	O	Volume control (up) signal output.
13	VOL DOWN	O	Volume control (down) signal output.
14	MOTOR NORM	O	Motor (normal turn) signal output.
15	MOTOR RVS	O	Motor (reverse turn) signal output.
16	SIRCS IN	I	Serial data input (SIRCS).
17	S1	I	Function selector positioning detection input (PHONO).
18	S2	I	Function selector positioning detection input (TUNER).
19	S3	I	Function selector positioning detection input (CD).
20	CNVSS	—	Ground.
21	VSS	—	Ground.
22	S4	I	Function selector positioning detection input (AUX).
23	S5	I	Function selector positioning detection input (TAPE 1).
24	S6	I	Function selector positioning detection input (TAPE 2).
25	S7	I	Ground.
26	CLOCK	O	Shift register for LED (CLK).
27	DATA	O	Shift register for LED (DATA).
28	LINE MUTE	O	Line mute signal output.
29	BRAKE RELEASE	O	Not in used.
30	PHONO	I	Function control input for Phono mode.
31	TUNER	I	Function control input for Tuner mode.
32	CD	I	Function control input for CD mode.
33	AUX	I	Function control input for AUX mode.
34	TAPE1	I	Function control input for Tape 1 mode.
35	TAPE2	I	Function control input for Tape 2 mode.
36	—	—	+5V power supply.
37	POWER ON/OFF	I	+5V power supply.
38	K0	I	Ground.
39	K1	I	+5V power supply.
40	K2	I	Ground.
41	K3	I	Ground.
42	MUTE	I	+5V power supply.

3-2. SEMICONDUCTOR LEAD LAYOUTS

BA6208
 μ PC1237HA



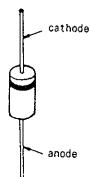
2SA985A-QP
2SC2275A-P



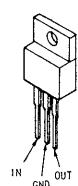
2SC3423-0



IN4148M



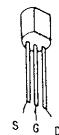
TA7805S



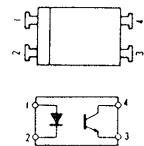
2SA988-PAFAEA
2SA1371-E
2SC2545-E



2SK246-GR2



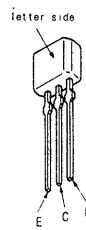
PC817



DTA114ES
DTC124ES
2SC2603-EF



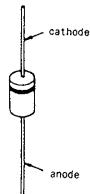
2SA1175-FEK



2SK1530-Y
2SJ201-Y



30DF2



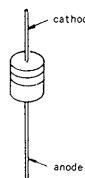
2SA733-QP
2SC945-P



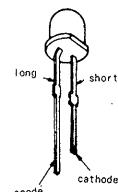
2SC1941-LK
2SD774-34



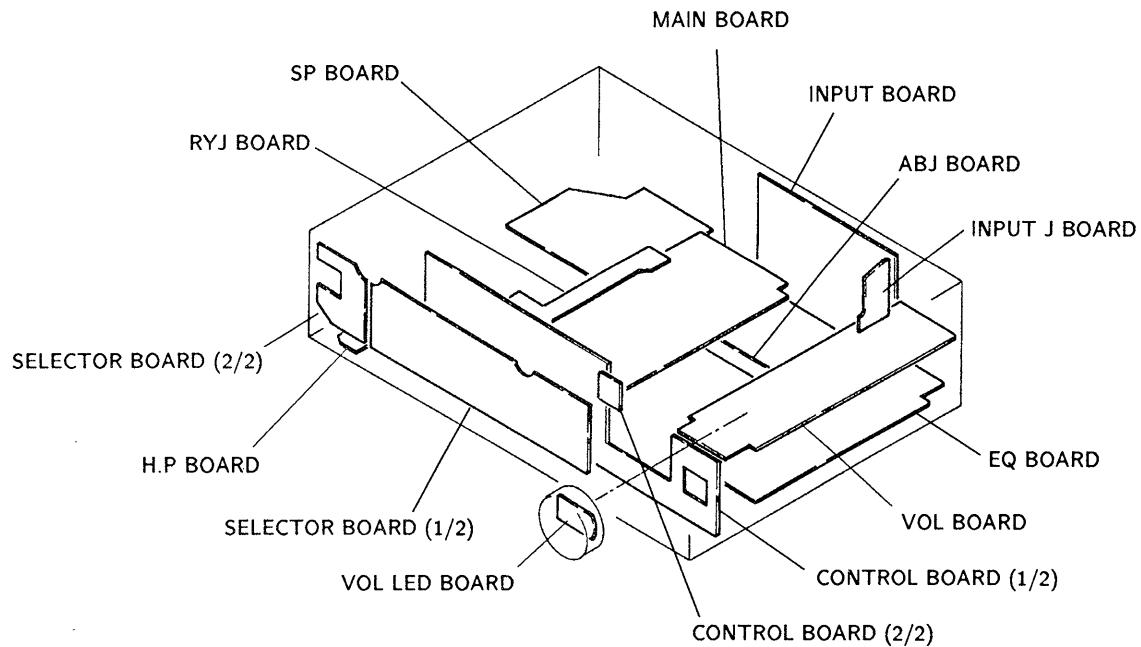
HZS6C3L
HZS16-2L
 μ ZL-7M1
11ES2



SEL1516W
SEL2510C-D
SEL2810A

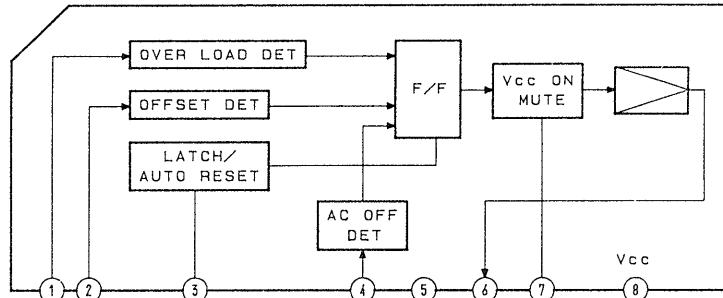


3-3. CIRCUIT BOARDS LOCATION

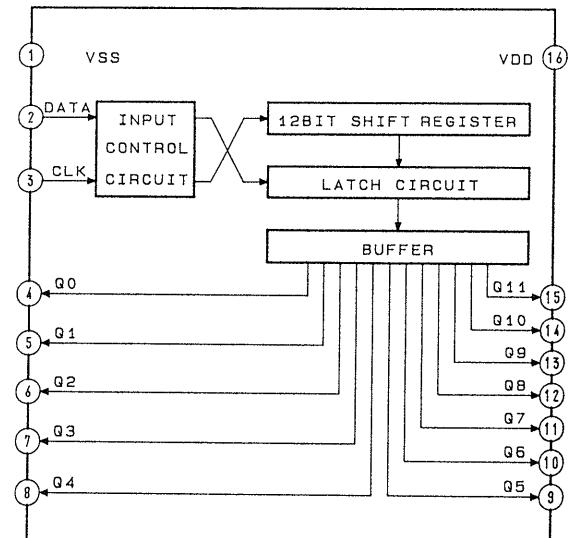


3-4. IC BLOCK DIAGRAMS

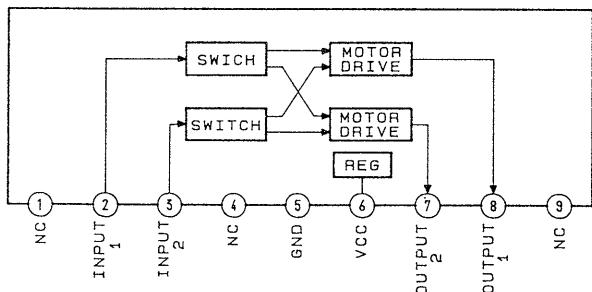
IC501 UPC1237HA



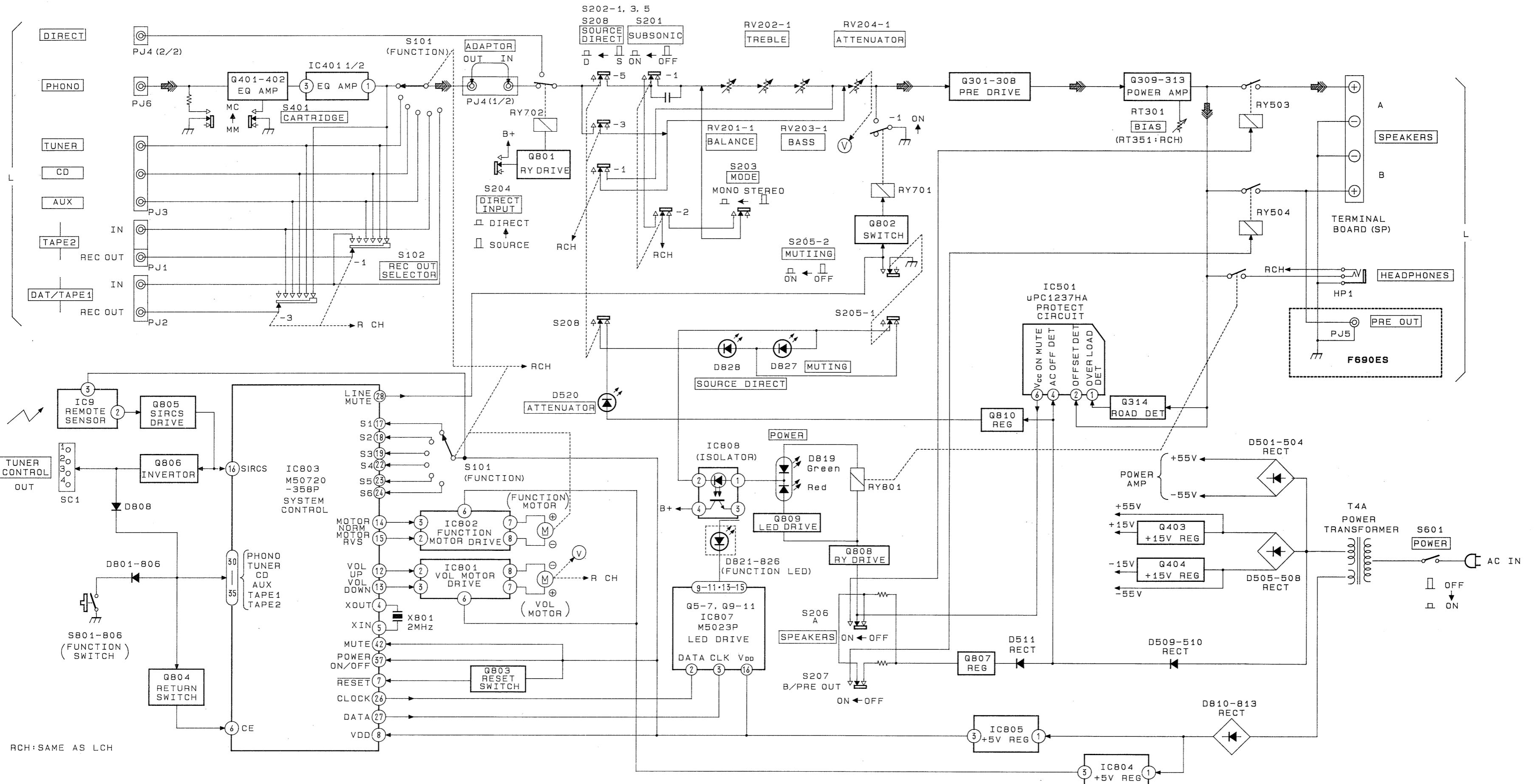
IC807 M50253P

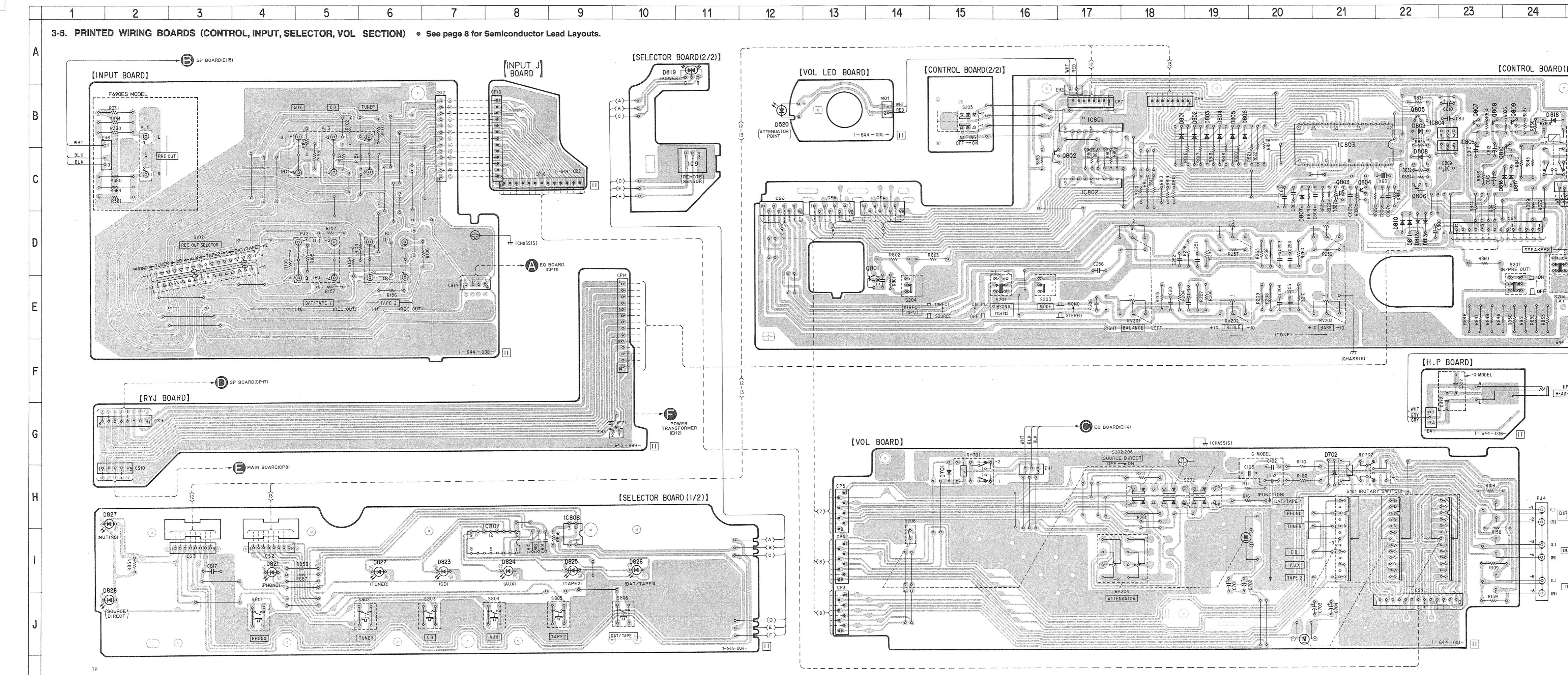


IC801, 802 BA6208



3-5. BLOCK DIAGRAM



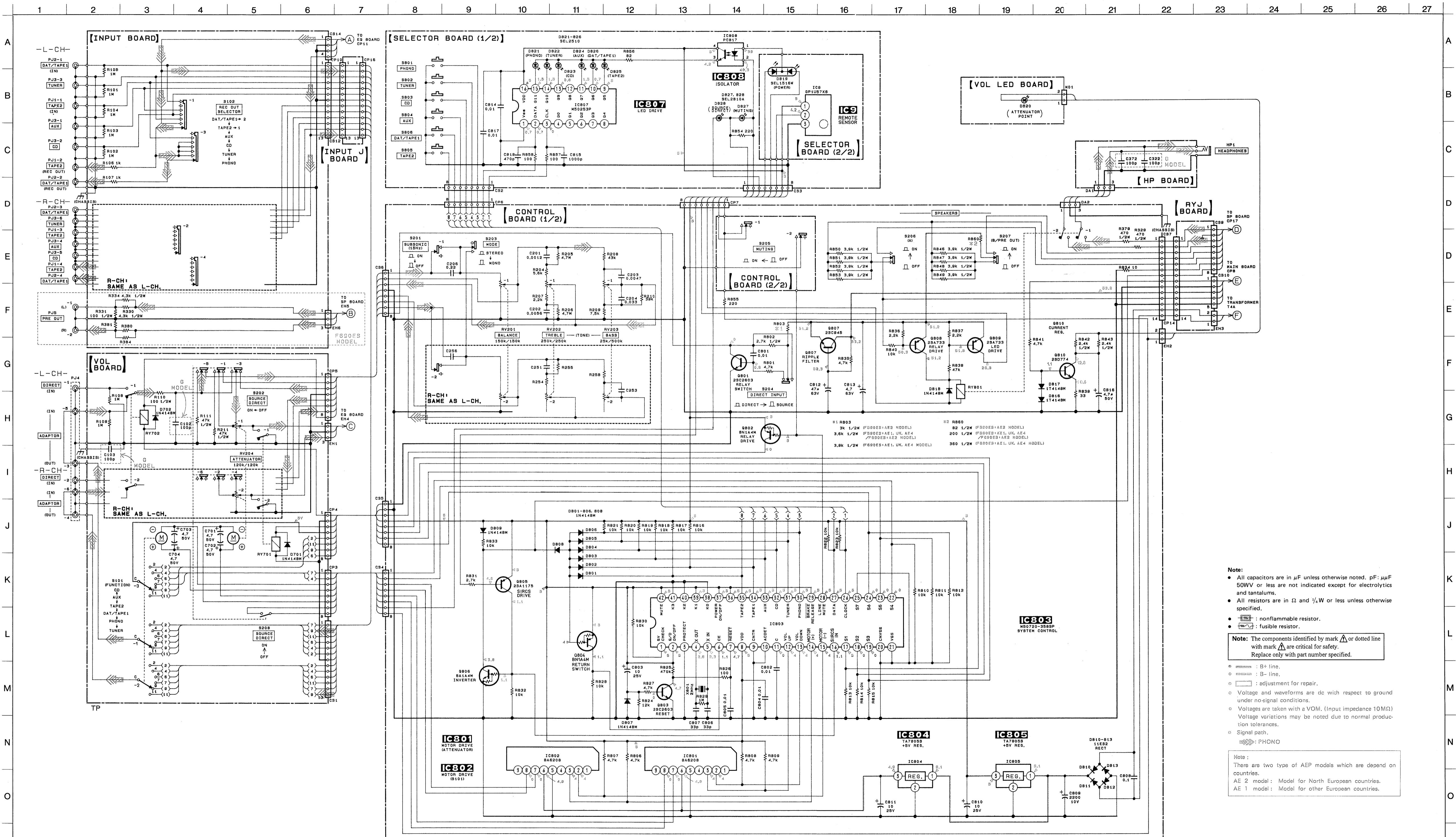


• Semiconductor Location

Ref. No.	Location
D620	B-12
D701	H-15
D702	H-21
D801	B-19
D802	B-19
D803	B-19
D804	B-19
D805	B-19
D806	B-19
D807	C-20
D808	C-22
D809	B-22
D810	D-22
D811	D-22
D812	D-22
D813	D-22
D814	C-24
D815	C-24
D816	B-24
D817	B-24
D818	B-24
D819	A-11
D820	I-4
D821	I-6
D822	I-7
D823	I-8
D824	I-9
D825	I-10
D826	H-2
D827	J-2
IIC9	C-11
IIC01	B-17
IIC02	C-17
IIC03	B-21
IIC04	B-23
IIC05	B-23
IIC07	I-8
IIC08	I-9
Q801	E-14
Q802	C-17
Q803	C-21
Q804	C-21
Q805	B-22
Q806	C-22
Q807	B-23
Q808	B-23
Q809	B-24
Q810	C-24

Note:
 • Dashed line: parts extracted from the component side.
 • Solid line: parts on the side with a cross-hatch.

Note:
 There are two types of A-E P model which are dependent on countries.
 A-E 2 model: Model for North European countries.
 A-E 1 model: Model for other European countries.



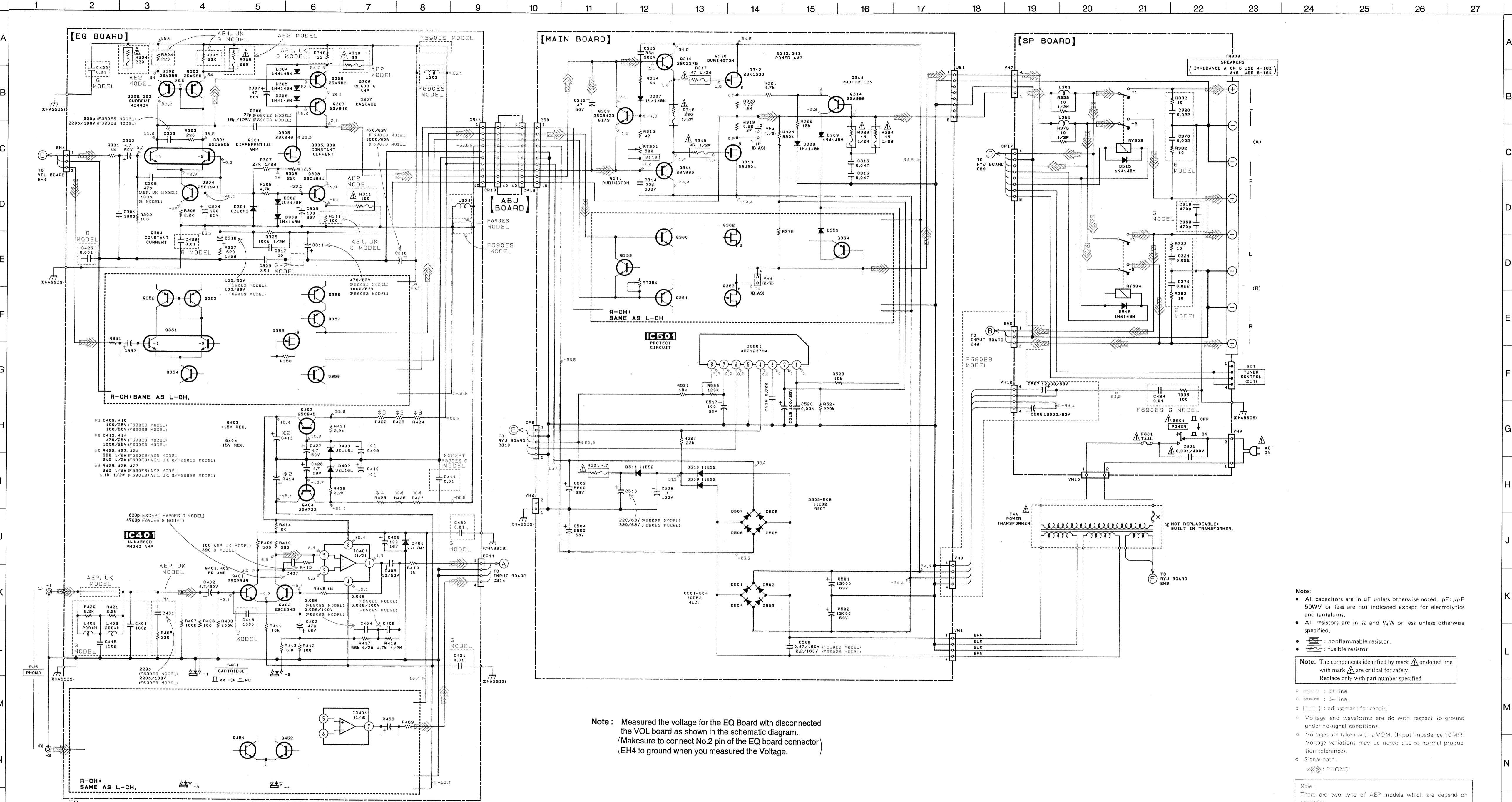
Note:

- All capacitors are in μ F unless otherwise noted. pF: $\mu\mu$ F 50WV or less are not indicated except for electrolytics and tantalums.
- All resistors are in Ω and $1/2$ W or less unless otherwise specified.
- : nonflammable resistor.
- : fusible resistor.

Note: The components identified by mark or dotted line with mark are critical for safety. Replace only with part number specified.

• : B+ line.
 : B- line.
 : adjustment for repair.
 : Voltage and waveforms are dc with respect to ground under no-signal conditions.
 : Voltages are taken with a VOM. (Input impedance 10M Ω) Voltage variations may be noted due to normal production tolerances.
 : Signal path.
 : PHONO

Note: There are two type of AEP models which are depend on countries.
 AE 2 model: Model for North European countries.
 AE 1 model: Model for other European countries.



Note : Measured the voltage for the EQ Board with disconnected the VOL board as shown in the schematic diagram.
(Makesure to connect No.2 pin of the EQ board connector)
EH4 to ground when you measured the Voltage.

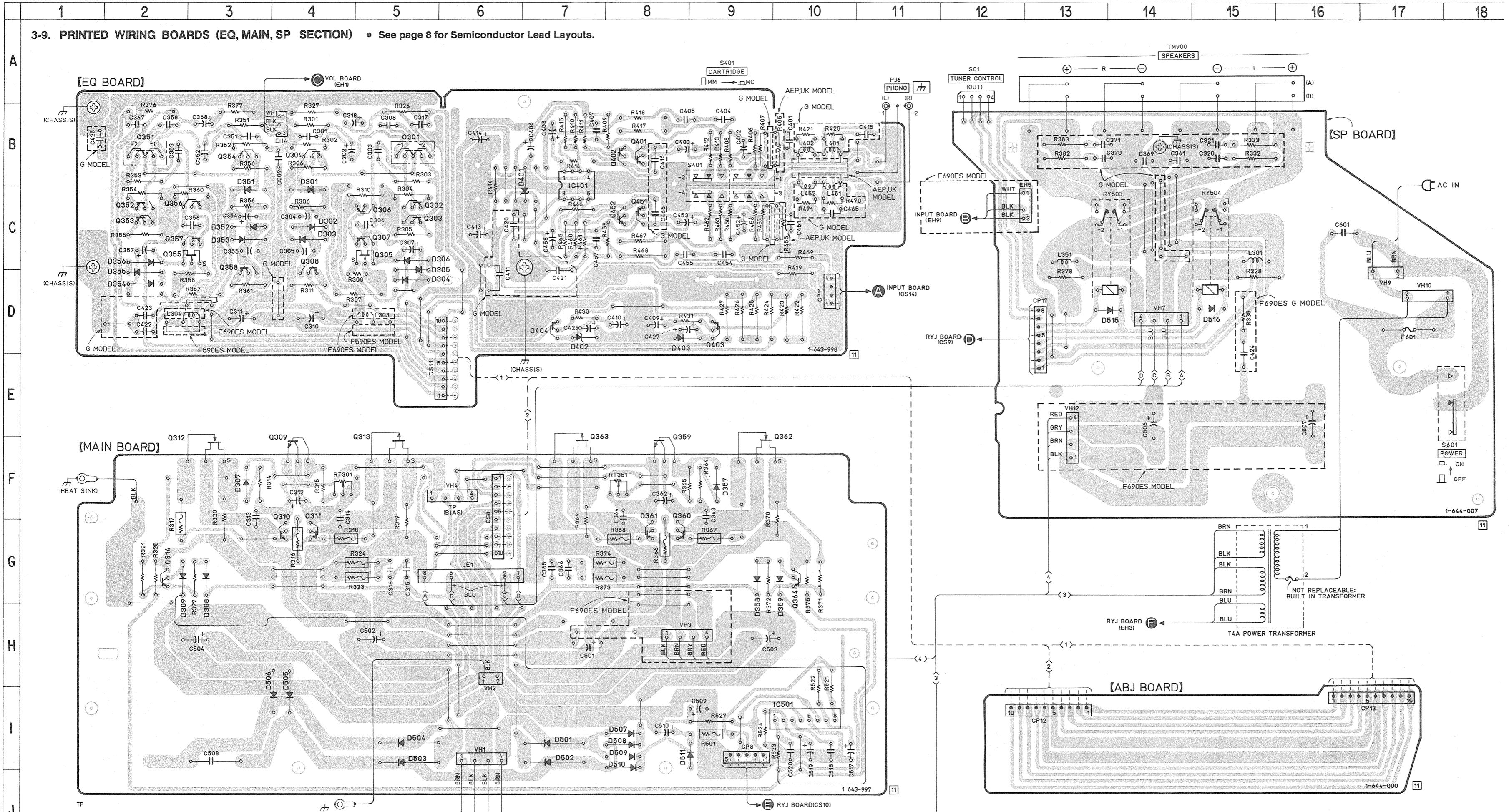
Note:

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- Signal path.
- : PHONO

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AE 2 model : Model for North European countries.
AE 1 model : Model for other European countries.



Semiconductor Location			
Ref. No.	Location	Ref. No.	Location
D301	C-4	IC501	I-10
D302	C-4		
D303	C-4	Q301	B-5
D304	D-5	Q302	C-5
D305	C-5	Q303	C-5
D306	C-5	Q304	B-4
D307	F-3	Q305	C-5
D308	G-3	Q306	C-5
D309	G-2	Q307	C-5
D351	C-3	Q308	D-4
D352	C-3	Q309	F-4
D353	C-3	Q310	G-4
D354	D-2	Q311	G-4
D355	D-2	Q312	F-3
D356	C-2	Q313	F-5
D357	F-9	Q314	G-2
D358	G-9	Q351	B-2
D359	G10	Q352	C-2
D401	C-7	Q353	C-2
D402	D-7	Q354	B-3
D403	D-8	Q355	C-3
D501	I-7	Q356	C-3
D502	I-7	Q357	C-3
D503	I-5	Q358	D-3
D504	I-5	Q359	F-8
D505	I-4	Q360	G-8
D506	I-4	Q361	G-8
D507	I-8	Q362	F-9
D508	I-8	Q363	F-7
D509	I-8	Q364	G-10
D510	I-8	Q401	B-8
D511	I-9	Q402	B-8
D515	D-14	Q403	D-9
D516	D-16	Q404	D-7
		Q451	C-8
IC401	B-7	Q452	C-8

- : parts extracted from the component side.
- : Pattern on the side which is seen.

Note :
there are two type of AEP models which are depend on
countries.
E 2 model : Model for North European countries.
E 1 model : Model for other European countries.

SECTION 4

EXPLODED VIEWS

NOTE:

- $-\text{XX}, -\text{X}$ mean standardized parts, so they may have some difference from the original one.
- Color indication of Appearance Parts.

Example:

Example.

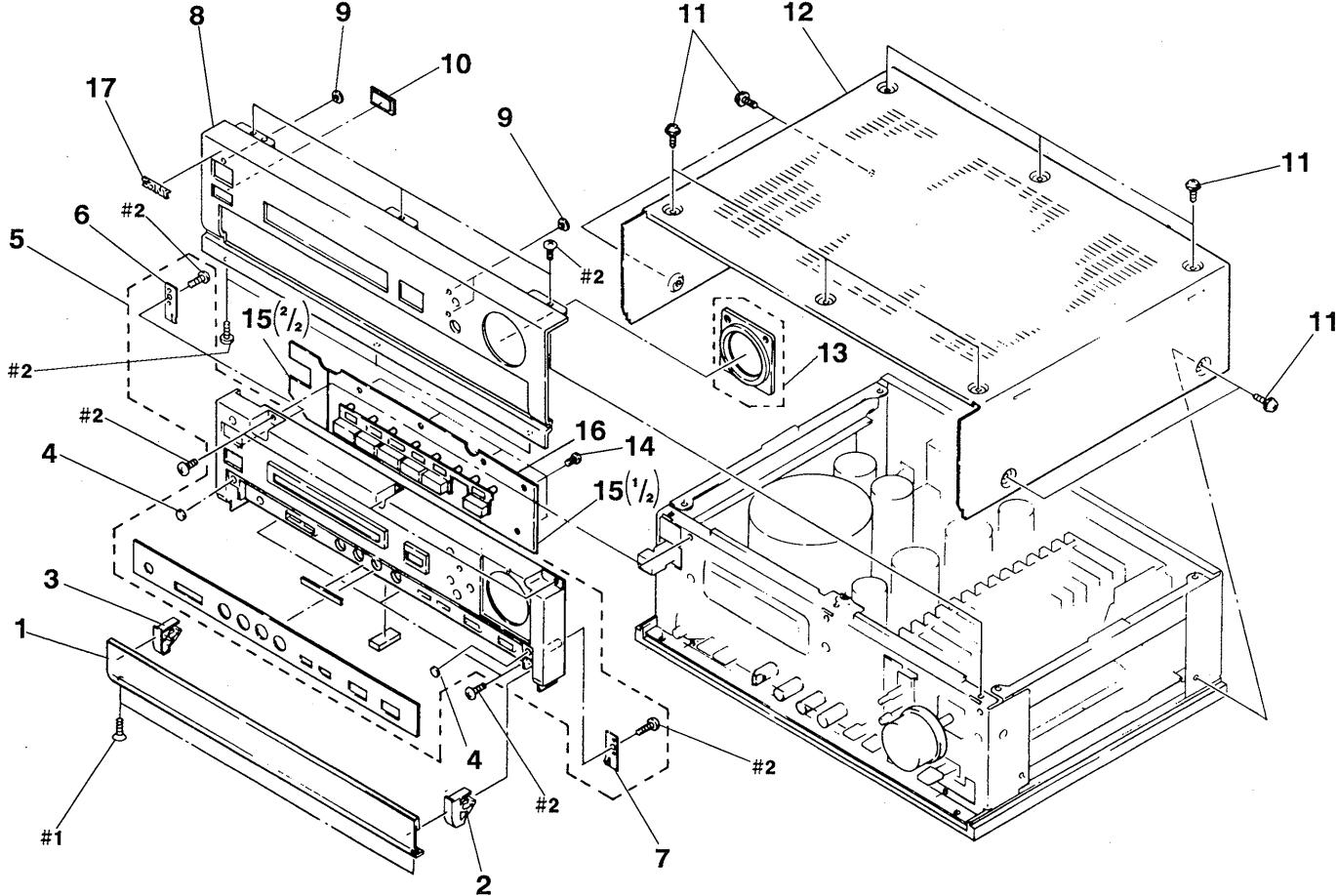
KNOB,BALANCE (WHITE) . . . (RED)

↑
Parts Cabinet's
Color Color

- Items marked “*” are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (# mark) list is given in the last of this parts list.

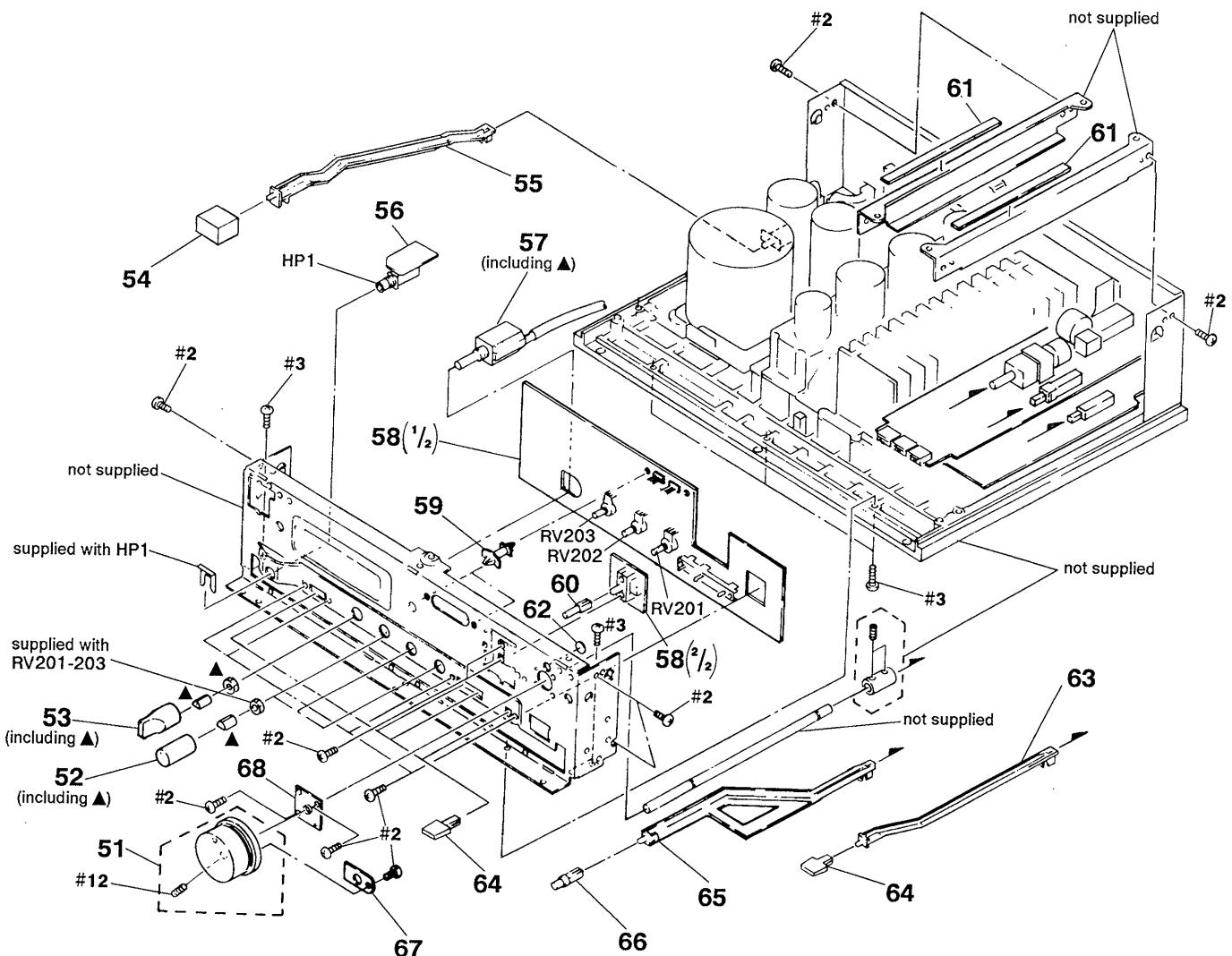
The components identified by mark  or dotted line with mark  are critical for safety.
Replace only with part number specified.

4-1. FRONT PANEL SECTION

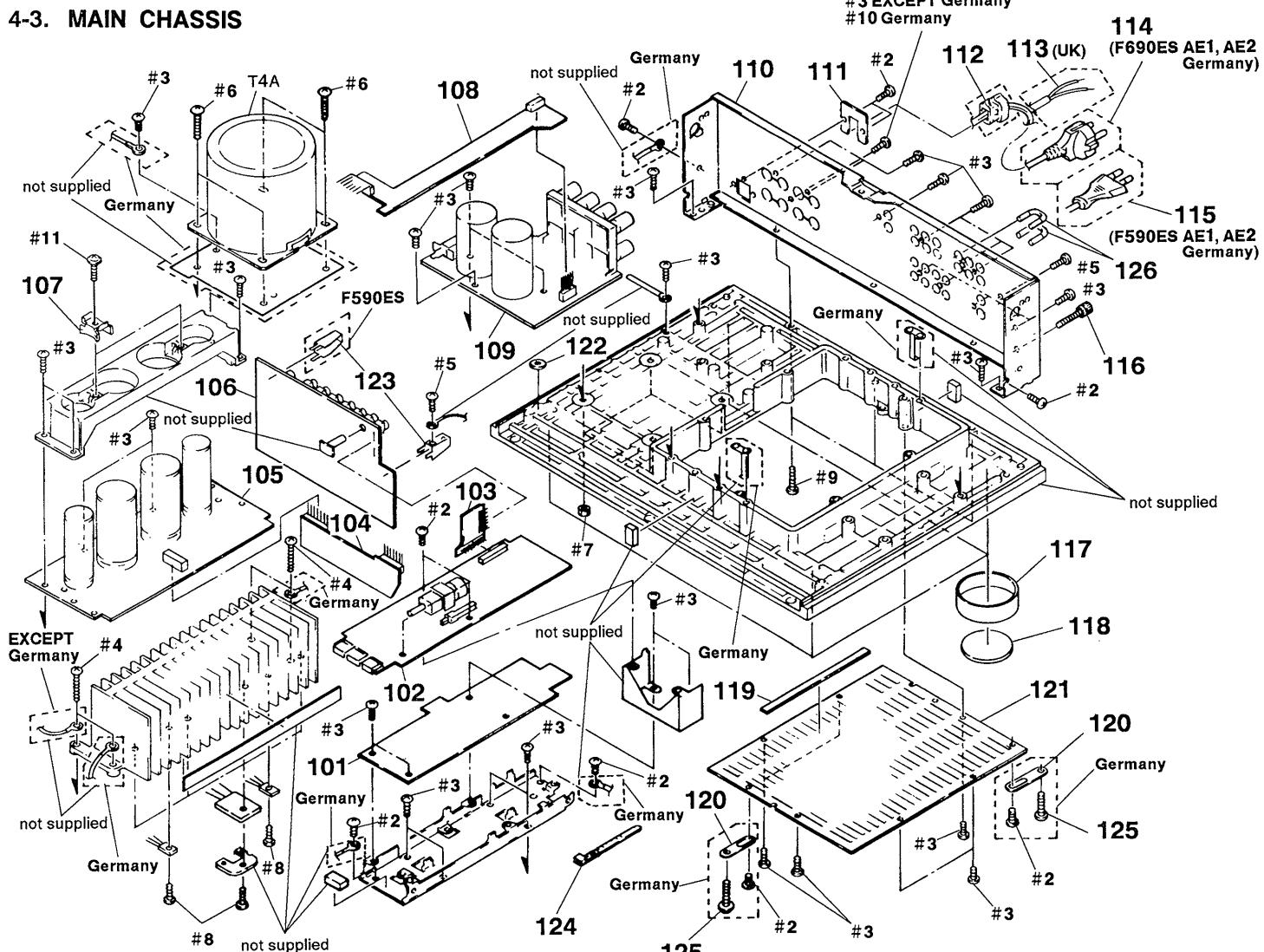


Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark
1	4-952-067-01	LID		9	4-931-646-01	LENS, LED	
2	4-942-226-01	ARM (R)		10	4-952-206-01	WINDOW, REMOTE CONTROL	
3	4-942-225-01	ARM (L)		11	3-704-366-01	SCREW (CASE) (M3X8)	
4	4-879-274-01	SPACER		* 12	4-946-347-01	CASE (F590ES:AEP, UK, Germany/F690ES:AEP, UK, Germany)	
5	X-4942-633-1	PANEL (BASE) ASSY (F590ES)		* 12	4-946-347-11	CASE (F590ES:AE2/F690ES:AE2)	
5	X-4942-634-1	PANEL (BASE) ASSY (F690ES)		13	4-946-324-01	RING (LARGE), ORNAMENTAL (F690ES)	
* 6	4-942-233-01	SPRING (L), PLATE		14	4-951-620-01	SCREW (2.6X8), +BVTP	
* 7	4-942-234-01	SPRING (R), PLATE		* 15	1-644-004-11	SELECTOR BOARD	
8	4-951-899-01	PANEL, FRONT (F590ES:AEP, AE2, Germany)		16	4-951-921-01	BUTTON (F)	
8	4-951-899-11	PANEL, FRONT (F690ES:AEP, AE2, Germany)		17	4-908-848-01	EMBLEM, SONY	
8	4-951-899-21	PANEL, FRONT (F590ES:UK)					
8	4-951-899-31	PANEL, FRONT (F690ES:UK)					

4-2. SUB CHASSIS



4-3. MAIN CHASSIS



SECTION 5

ELECTRICAL PARTS LIST

NOTE:

- Due to standardization, replacements in the parts list may be different from the part specified in the diagrams or the components used on the set.
- -XX,-X mean standardized parts, so they may have some difference from the original one.
- **RESISTORS**
All resistors are in ohms
METAL : Metal-film resistor
METAL OXIDE : Metal Oxide-film resistor
E : nonflammable

- Items marked “*” are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- **SEMICONDUCTORS**
In each case, μ : μ , for example :
 $\mu A \dots : \mu A \dots$, $\mu PA \dots : \mu PA \dots$,
 $\mu PB \dots : \mu PB \dots$, $\mu PC \dots : \mu PC \dots$,
 $\mu PD \dots : \mu PD \dots$
- **CAPACITORS**
 $\mu F : \mu F$
- **COILS**
 $\mu H : \mu H$

When indicating parts by reference number, please include the board name.

The components identified by mark  or dotted line with mark  are critical for safety.
Replace only with part number specified.

- Abbreviation
 - AE2: North European model
 - AE4: Germany model

CONTROL

Ref. No.	Part No.	Description			Remark	Ref. No.	Part No.	Description			Remark
< IC >											
IC801	8-759-962-08	IC	BA6208			R811	1-249-429-11	CARBON	10K	5%	1/4W
IC802	8-759-962-08	IC	BA6208			R812	1-249-429-11	CARBON	10K	5%	1/4W
IC803	8-759-082-11	IC	M50720-358SP (SYSTEM CONTROLLER)			R813	1-249-429-11	CARBON	10K	5%	1/4W
IC804	8-759-234-64	IC	TA7805S			R814	1-249-429-11	CARBON	10K	5%	1/4W
IC805	8-759-234-64	IC	TA7805S			R815	1-249-429-11	CARBON	10K	5%	1/4W
< TRANSISTOR >											
Q801	8-729-620-05	TRANSISTOR	2SC2603-EF			R816	1-249-429-11	CARBON	10K	5%	1/4W
Q802	8-729-900-61	TRANSISTOR	DTA114ES			R817	1-249-429-11	CARBON	10K	5%	1/4W
Q803	8-729-620-05	TRANSISTOR	2SC2603-EF			R818	1-249-429-11	CARBON	10K	5%	1/4W
Q804	8-729-900-61	TRANSISTOR	DTA114ES			R819	1-249-429-11	CARBON	10K	5%	1/4W
Q805	8-729-119-77	TRANSISTOR	2SA1175-FEK			R820	1-249-429-11	CARBON	10K	5%	1/4W
Q806	8-729-900-36	TRANSISTOR	DTC124ES			R821	1-249-429-11	CARBON	10K	5%	1/4W
Q807	8-729-194-57	TRANSISTOR	2SC945-P			R822	1-249-429-11	CARBON	10K	5%	1/4W
Q808	8-729-141-03	TRANSISTOR	2SA733-QP			R823	1-249-429-11	CARBON	10K	5%	1/4W
Q809	8-729-141-03	TRANSISTOR	2SA733-QP			R824	1-249-430-11	CARBON	12K	5%	1/4W
Q810	8-729-140-96	TRANSISTOR	2SD774-34			R825	1-247-895-00	CARBON	470K	5%	1/4W
< RESISTOR >											
R204	1-247-722-11	CARBON	5.6K	5%	1/4W	R826	1-249-405-11	CARBON	100	5%	1/4W
R205	1-259-502-11	CARBON	4.7M	5%	1/4W	R827	1-249-425-11	CARBON	4.7K	5%	1/4W
R206	1-259-502-11	CARBON	4.7M	5%	1/4W	R828	1-249-429-11	CARBON	10K	5%	1/4W
R207	1-247-717-11	CARBON	2.2K	5%	1/4W	R829	1-247-903-00	CARBON	1M	5%	1/4W
R208	1-259-467-11	CARBON	43K	5%	1/4W	R830	1-249-429-11	CARBON	10K	5%	1/4W
R209	1-247-152-00	CARBON	7.5K	5%	1/4W	R831	1-249-421-11	CARBON	2.2K	5%	1/4W
R210	1-249-590-11	CARBON	39K	5%	1/4W	R832	1-249-429-11	CARBON	10K	5%	1/4W
R254	1-247-722-11	CARBON	5.6K	5%	1/4W	R833	1-249-429-11	CARBON	10K	5%	1/4W
R255	1-259-502-11	CARBON	4.7M	5%	1/4W	R834	1-249-393-11	CARBON	10	5%	1/4W
R256	1-259-502-11	CARBON	4.7M	5%	1/4W	R835	1-249-425-11	CARBON	4.7K	5%	1/4W
R257	1-247-717-11	CARBON	2.2K	5%	1/4W	R836	1-249-421-11	CARBON	2.2K	5%	1/4W
R258	1-259-467-11	CARBON	43K	5%	1/4W	R837	1-249-421-11	CARBON	2.2K	5%	1/4W
R259	1-247-152-00	CARBON	7.5K	5%	1/4W	R838	1-249-437-11	CARBON	47K	5%	1/4W
R260	1-249-590-11	CARBON	39K	5%	1/4W	R839	1-249-399-11	CARBON	33	5%	1/4W
R329	1-247-747-11	CARBON	470	5%	1/2W	R840	1-249-429-11	CARBON	10K	5%	1/4W
R379	1-247-747-11	CARBON	470	5%	1/2W	R841	1-249-425-11	CARBON	4.7K	5%	1/4W
R801	1-249-425-11	CARBON	4.7K	5%	1/4W	R842	1-247-249-00	CARBON	2.4K	5%	1/2W
R802	1-247-757-11	CARBON	2.7K	5%	1/2W	R843	1-247-249-00	CARBON	2.4K	5%	1/2W
R803	1-247-251-00	CARBON	3K	5%	1/2W (F590ES:AE2)	R846	1-247-759-11	CARBON	3.9K	5%	1/2W
R803	1-247-253-00	CARBON	3.6K	5%	1/2W (F590ES:AEP, UK, Germany/F690ES:AE2)	R847	1-247-759-11	CARBON	3.9K	5%	1/2W
R803	1-247-759-11	CARBON	3.9K	5%	1/2W (F690ES:AEP, UK, Germany)	R848	1-247-759-11	CARBON	3.9K	5%	1/2W
R806	1-249-425-11	CARBON	4.7K	5%	1/4W	R849	1-247-759-11	CARBON	3.9K	5%	1/2W
R807	1-249-425-11	CARBON	4.7K	5%	1/4W	R850	1-247-759-11	CARBON	3.9K	5%	1/2W
R808	1-249-425-11	CARBON	4.7K	5%	1/4W	R851	1-247-759-11	CARBON	3.9K	5%	1/2W
R809	1-249-425-11	CARBON	4.7K	5%	1/4W	R852	1-247-759-11	CARBON	3.9K	5%	1/2W
R810	1-249-429-11	CARBON	10K	5%	1/4W	R853	1-247-759-11	CARBON	3.9K	5%	1/2W
						R855	1-249-409-11	CARBON	220	5%	1/4W
						R860	1-247-223-00	CARBON	200	5%	1/2W (F590ES:AEP, UK, Germany/F690ES:AE2)
						R860	1-247-229-00	CARBON	360	5%	1/2W (F690ES:AEP, UK, Germany)
						R860	1-247-738-11	CARBON	82	5%	1/2W (F590ES:AE2)

Ref. No.	Part No.	Description	Remark
< VARIABLE RESISTOR >			
RV201	1-238-448-31	RES, VAR, CARBON 150K/150K (BALANCE)	
RV202	1-238-446-31	RES, VAR, CARBON 250K/250K (TREBLE)	
RV203	1-238-447-31	RES, VAR, CARBON 25K/500K (BASS)	
< RELAY >			
RY801	1-515-787-11	RELAY (HP)	
< SWITCH >			
S201	1-692-141-11	SWITCH, PUSH (3 KEY) (SUBSONIC (15HZ))	
S203	1-692-141-11	SWITCH, PUSH (3 KEY) (MODE)	
S204	1-692-141-11	SWITCH, PUSH (3 KEY) (DIRECT INPUT)	
S205	1-572-740-11	SWITCH, PUSH (1 KEY) (MUTING)	
S206	1-572-739-11	SWITCH, PUSH (2 KEY) (SPEAKERS, A)	
S207	1-572-739-11	SWITCH, PUSH(2 KEY) (SPEAKERS, B/PRE OUT)	
< VIBRATOR >			
X801	1-567-254-11	OSCILLATOR, CERAMIC (2MHz)	

*	A-4347-829-A	EQ BOARD, COMPLETE (F690ES:AEP, UK)	
*	A-4347-834-A	EQ BOARD, COMPLETE (F690ES:AE2)	
*	A-4347-836-A	EQ BOARD, COMPLETE (F690ES:Germany)	
*	A-4347-841-A	EQ BOARD, COMPLETE (F590ES:AEP, UK)	
*	A-4347-850-A	EQ BOARD, COMPLETE (F590ES:AE2)	
*	A-4347-855-A	EQ BOARD, COMPLETE (F590ES:Germany)	

< CAPACITOR >			
C301	1-104-278-11	POLYSTYRENE	100PF 5% 50V (F690ES)
C301	1-110-335-11	MYLAR	100PF 5% 50V (F590ES)
C302	1-123-369-00	ELECT	4.7uF 20% 50V
C303	1-110-339-11	MYLAR	220PF 5% 50V (F590ES)
C303	1-136-810-11	FILM	220PF 5% 100V(F690ES)
C304	1-124-122-11	ELECT	100uF 20% 50V
C305	1-124-122-11	ELECT	100uF 20% 50V
C306	1-102-959-91	CERAMIC	22PF 5% 50V (F590ES)
C306	1-104-327-11	STYROL	22PF 10% 125V(F690ES)
C307	1-124-910-11	ELECT	47uF 20% 50V
C308	1-101-880-00	CERAMIC	47PF 5% 50V (F590ES:AEP, AE2, UK)
C308	1-104-274-11	POLYSTYRENE	47PF 10% 50V (F690ES:AEP, AE2, UK)
C308	1-104-278-11	POLYSTYRENE	100PF 5% 50V (F690ES:Germany)
C308	1-110-335-11	MYLAR	100PF 5% 50V (F590ES:Germany)

Ref. No.	Part No.	Description	Remark
C309	1-130-483-00	MYLAR	0.01uF 5% 50V
C310	1-124-922-11	ELECT	1000uF 20% 63V (F690ES)
C310	1-126-066-11	ELECT	470uF 20% 63V (F590ES)
C311	1-124-922-11	ELECT	1000uF 20% 63V (F690ES)
C311	1-126-066-11	ELECT	470uF 20% 63V (F590ES)
C313	1-107-159-00	MICA	33PF 5% 500V(F690ES)
C317	1-102-942-00	CERAMIC	5.0PF +-0.5PF 50V(F590ES)
C318	1-124-130-00	ELECT	100uF 20% 63V (F690ES)
C318	1-126-052-11	ELECT	100uF 20% 50V (F590ES)
C351	1-104-278-11	POLYSTYRENE	100PF 5% 50V (F690ES)
C351	1-110-335-11	MYLAR	100PF 5% 50V (F590ES)
C352	1-123-369-00	ELECT	4.7uF 20% 50V
C353	1-110-339-11	MYLAR	220PF 5% 50V (F590ES)
C353	1-136-810-11	FILM	220PF 5% 100V(F690ES)
C354	1-124-122-11	ELECT	100uF 20% 50V
C355	1-124-122-11	ELECT	100uF 20% 50V
C356	1-102-959-91	CERAMIC	22PF 5% 50V (F590ES)
C356	1-104-327-11	STYROL	22PF 10% 125V(F690ES)
C357	1-124-910-11	ELECT	47uF 20% 50V
C358	1-104-278-11	POLYSTYRENE	100PF 5% 50V (F690ES:Germany)
C358	1-110-335-11	MYLAR	100PF 5% 50V (F590ES:Germany)
C358	1-101-880-00	CERAMIC	47PF 5% 50V (F590ES:AEP, AE2, UK)
C358	1-104-274-11	POLYSTYRENE	47PF 10% 50V (F690ES:AEP, AE2, UK)
C367	1-102-942-00	CERAMIC	5.0PF +-0.5PF 50V (F590ES)
C367	1-107-026-00	MICA	5.1PF 500V(F690ES)
C368	1-124-130-00	ELECT	100uF 20% 63V (F690ES)
C368	1-126-052-11	ELECT	100uF 20% 50V (F590ES)
C401	1-104-278-11	POLYSTYRENE	100PF 5% 50V (F690ES:Germany)
C401	1-110-335-11	MYLAR	100PF 5% 50V (F590ES:Germany)
C401	1-110-339-11	MYLAR	220PF 5% 50V (F590ES:AEP, AE2, UK)
C401	1-136-810-11	FILM	220PF 5% 100V (F690ES:AEP, AE2, UK)
C402	1-123-369-00	ELECT	4.7uF 20% 50V
C403	1-126-103-11	ELECT	470uF 20% 16V
C404	1-130-341-00	FILM	0.056uF 2% 100V(F690ES)
C404	1-136-162-00	FILM	0.056uF 5% 50V(F590ES)
C405	1-130-971-00	FILM	0.016uF 2% 100V(F690ES)
C405	1-137-471-11	FILM	0.016uF 5% 50V(F590ES)
C406	1-124-122-11	ELECT	100uF 20% 50V
C407	1-130-479-00	FILM	4700PF 5% 50V
C408	1-126-059-11	ELECT	10uF 20% 50V

Ref. No.	Part No.	Description			Remark		Ref. No.	Part No.	Description			Remark	
C409	1-124-122-11	ELECT	100uF	20%	50V	(F590ES)	C466	1-162-282-31	CERAMIC	100PF	10%	50V	(F590ES:Germany/F690ES:Germany)
C409	1-126-052-11	ELECT	100uF	20%	50V	(F690ES)							< CONPOSITION CIRCUIT BLOCK >
C410	1-124-122-11	ELECT	100uF	20%	50V	(F590ES)	CP11	1-560-941-00	PIN, CONNECTOR 4P				< CONNECTOR >
C410	1-126-052-11	ELECT	100uF	20%	50V	(F690ES)	* CS11	1-562-334-00	SOCKET, CONNECTOR 10P				< DIODE >
C411	1-161-379-00	CERAMIC	0.01uF	20%	25V	(F690ES:Germany)	D301	8-719-933-41	DIODE	HZS6C3L			
C413	1-124-557-11	ELECT	1000uF	20%	25V	(F690ES)	D302	8-719-987-63	DIODE	1N4148M			
C413	1-124-913-11	ELECT	470uF	20%	50V	(F590ES)	D303	8-719-987-63	DIODE	1N4148M			
C414	1-124-913-11	ELECT	470uF	20%	50V	(F590ES)	D304	8-719-987-63	DIODE	1N4148M			
C414	1-124-557-11	ELECT	1000uF	20%	25V	(F690ES)	D305	8-719-987-63	DIODE	1N4148M			
C415	1-104-282-11	POLYSTYRENE	150PF	5%	50V	(F690ES:Germany)	D306	8-719-987-63	DIODE	1N4148M			
C415	1-101-361-00	CERAMIC		150PF	5%	50V	D351	8-719-933-41	DIODE	HZS6C3L			
						(F590ES:Germany)	D352	8-719-987-63	DIODE	1N4148M			
C416	1-162-282-31	CERAMIC		100PF	10%	50V	D353	8-719-987-63	DIODE	1N4148M			
						(F590ES:Germany/F690ES:Germany)	D354	8-719-987-63	DIODE	1N4148M			
C420	1-161-379-00	CERAMIC	0.01uF	20%	25V	(F590ES:Germany/F690ES:Germany)	D355	8-719-987-63	DIODE	1N4148M			
C421	1-161-379-00	CERAMIC	0.01uF	20%	25V	(F590ES:Germany/F690ES:Germany)	D356	8-719-987-63	DIODE	1N4148M			
C422	1-106-367-00	MYLAR	0.01uF	5%	200V	(F590ES:Germany/F690ES:Germany)	D401	8-719-000-84	DIODE	UZL-7M1			
C423	1-106-367-00	MYLAR	0.01uF	5%	200V	(F590ES:Germany/F690ES:Germany)	D402	8-719-933-88	DIODE	HZS16-2L			
C425	1-162-294-31	CERAMIC	0.001uF	10%	50V	(F590ES:Germany/F690ES:Germany)	D403	8-719-933-88	DIODE	HZS16-2L			
C426	1-123-369-00	ELECT	4.7uF	20%	50V								< CONNECTOR >
C427	1-123-369-00	ELECT	4.7uF	20%	50V		* EH4	1-564-506-11	PLUG, CONNECTOR 3P				
C451	1-104-278-11	POLYSTYRENE	100PF	5%	50V	(F690ES:Germany)							< IC >
C451	1-110-335-11	MYLAR	100PF	5%	50V	(F590ES:Germany)	IC401	8-759-745-61	IC	NJM4560D-D			
C451	1-110-339-11	MYLAR	220PF	5%	50V	(F590ES:AEP, AE2, UK)							< COIL >
C451	1-136-810-11	FILM	220PF	5%	100V	(F690ES:AEP, AE2, UK)	* L303	1-428-203-11	COIL, AIR-CORE	(F690ES)			
C452	1-123-369-00	ELECT	4.7uF	20%	50V		* L304	1-428-203-11	COIL, AIR-CORE	(F690ES)			
C453	1-126-103-11	ELECT	470uF	20%	16V		L401	1-424-397-11	COIL, CHOKE	200uH	(F590ES:Germany/F690ES:Germany)		
C454	1-130-341-00	FILM	0.056uF	2%	100V	(F690ES)	L402	1-424-397-11	COIL, CHOKE	200uH	(F590ES:Germany/F690ES:Germany)		
C454	1-136-162-00	FILM	0.056uF	5%	50V	(F590ES)	L451	1-424-397-11	COIL, CHOKE	200uH	(F590ES:Germany/F690ES:Germany)		
C455	1-130-971-00	FILM	0.016uF	2%	100V	(F690ES)	L452	1-424-397-11	COIL, CHOKE	200uH	(F590ES:Germany/F690ES:Germany)		
C455	1-137-471-11	FILM	0.016uF	5%	50V	(F590ES)							
C457	1-130-479-00	FILM		4700PF	5%	50V							
C458	1-126-059-11	ELECT		10uF	20%	50V							
C465	1-101-361-00	CERAMIC		150PF	5%	50V							< JACK >
C465	1-104-282-11	POLYSTYRENE	150PF	5%	50V	(F690ES:Germany)	PJ6	1-580-054-11	JACK, PIN 2P	(PHONO)			

Ref. No.	Part No.	Description			Remark	Ref. No.	Part No.	Description			Remark
< TRANSISTOR >											
Q301	8-729-620-17	TRANSISTOR	2SC2259-FG			R326	1-249-721-11	CARBON	100K	5%	1/2W
Q302	8-729-140-82	TRANSISTOR	2SA988-PAFAEA			R327	1-249-668-11	CARBON	620	5%	1/2W
Q303	8-729-140-82	TRANSISTOR	2SA988-PAFAEA			R351	1-247-713-11	CARBON	1K	5%	1/4W
Q304	8-729-142-01	TRANSISTOR	2SC1941-LK			R352	1-249-469-11	CARBON	100K	5%	1/4W
Q305	8-729-201-56	TRANSISTOR	2SK246-GR2			R353	1-247-704-11	CARBON	220	5%	1/4W
Q306	8-729-140-82	TRANSISTOR	2SA988-PAFAEA			△R354	1-212-889-00	FUSIBLE	220	5%	1/4W F (F590ES:AE2/F690ES:AE2)
Q307	8-729-803-76	TRANSISTOR	2SA1371-E			R354	1-247-704-11	CARBON	220	5%	1/4W (F590ES:AEP, UK, Germany/F690ES:AEP, UK, Germany)
Q308	8-729-142-01	TRANSISTOR	2SC1941-LK			△R355	1-212-889-00	FUSIBLE	220	5%	1/4W F (F590ES:AE2/F690ES:AE2)
Q351	8-729-620-17	TRANSISTOR	2SC2259-FG			R355	1-247-704-11	CARBON	220	5%	1/4W (F590ES:AEP, UK, Germany/F690ES:AEP, UK, Germany)
Q352	8-729-140-82	TRANSISTOR	2SA988-PAFAEA			R356	1-247-717-11	CARBON	2.2K	5%	1/4W
Q353	8-729-140-82	TRANSISTOR	2SA988-PAFAEA			R357	1-249-490-11	CARBON	27K	5%	1/2W
Q354	8-729-142-01	TRANSISTOR	2SC1941-LK			R358	1-247-704-11	CARBON	220	5%	1/4W
Q355	8-729-201-56	TRANSISTOR	2SK246-GR2			R359	1-247-721-11	CARBON	4.7K	5%	1/4W
Q356	8-729-140-82	TRANSISTOR	2SA988-PAFAEA			△R360	1-212-869-00	FUSIBLE	33	5%	1/4W F (F590ES:AE2/F690ES:AE2)
Q357	8-729-803-76	TRANSISTOR	2SA1371-E			R360	1-249-887-91	CARBON	33	1%	1/4W (F590ES:AEP, UK, Germany/F690ES:AEP, UK, Germany)
Q358	8-729-142-01	TRANSISTOR	2SC1941-LK			△R361	1-212-881-11	FUSIBLE	100	5%	1/4W F (F590ES:AE2/F690ES:AE2)
Q401	8-729-354-52	TRANSISTOR	2SC2545-E			R361	1-247-700-11	CARBON	100	5%	1/4W (F590ES:AEP, UK, Germany/F690ES:AEP, UK, Germany)
Q402	8-729-354-52	TRANSISTOR	2SC2545-E			R376	1-249-721-11	CARBON	100K	5%	1/2W
Q403	8-729-194-57	TRANSISTOR	2SC945-P			R377	1-249-668-11	CARBON	620	5%	1/2W
Q404	8-729-141-03	TRANSISTOR	2SA733-QP			R405	1-247-706-11	CARBON	330	5%	1/4W (F590ES:AEP, AE2, UK/F690ES:AEP, AE2, UK)
Q451	8-729-354-52	TRANSISTOR	2SC2545-E			R406	1-247-700-11	CARBON	100	5%	1/4W
Q452	8-729-354-52	TRANSISTOR	2SC2545-E			R407	1-249-469-11	CARBON	100K	5%	1/4W
< RESISTOR >											
R301	1-247-713-11	CARBON	1K	5%	1/4W	R408	1-249-469-11	CARBON	100K	5%	1/4W
R302	1-249-469-11	CARBON	100K	5%	1/4W	R409	1-247-710-11	CARBON	560	5%	1/4W
R303	1-247-704-11	CARBON	220	5%	1/4W	R410	1-247-710-11	CARBON	560	5%	1/4W
△R304	1-212-889-00	FUSIBLE	220	5%	1/4W F (F590ES:AE2/F690ES:AE2)	R411	1-247-725-11	CARBON	10K	5%	1/4W
R304	1-247-704-11	CARBON	220	5%	1/4W (F590ES:AEP, UK, Germany/F690ES:AEP, UK, Germany)	R412	1-247-700-11	CARBON	100	5%	1/4W
△R305	1-212-889-00	FUSIBLE	220	5%	1/4W F (F590ES:AE2/F690ES:AE2)	R413	1-260-661-11	CARBON	6.8	5%	1/4W
R305	1-247-704-11	CARBON	220	5%	1/4W (F590ES:AEP, UK, Germany/F690ES:AEP, UK, Germany)	R414	1-247-138-00	CARBON	2K	5%	1/4W
R306	1-247-717-11	CARBON	2.2K	5%	1/4W	R415	1-247-700-11	CARBON	100	5%	1/4W (F590ES:AEP, AE2, UK/F690ES:AEP, AE2, UK)
R307	1-249-490-11	CARBON	27K	5%	1/2W	R415	1-249-542-11	CARBON	390	5%	1/4W (F590ES:Germany/F690ES:Germany)
R308	1-247-704-11	CARBON	220	5%	1/4W	R416	1-246-545-00	CARBON	1.0M	5%	1/4W
R309	1-247-721-11	CARBON	4.7K	5%	1/4W	R417	1-249-844-11	CARBON	56K	1%	1/2W
△R310	1-212-869-00	FUSIBLE	33	5%	1/4W F (F590ES:AE2/F690ES:AE2)	R418	1-249-818-11	CARBON	4.7K	1%	1/2W
R310	1-249-887-91	CARBON	33	1%	1/4W (F590ES:AEP, UK, Germany/F690ES:AEP, UK, Germany)	R419	1-247-713-11	CARBON	1K	5%	1/4W
△R311	1-212-881-11	FUSIBLE	100	5%	1/4W F (F590ES:AE2/F690ES:AE2)						
R311	1-247-700-11	CARBON	100	5%	1/4W (F590ES:AEP, UK, Germany/F690ES:AEP, UK, Germany)						

Note: The components identified by mark ▲ or dotted line with mark △ are critical for safety. Replace only with part number specified.

TA-F590ES/F690ES

EQ

H.P

INPUT

Ref. No.	Part No.	Description			Remark
R420	1-249-421-11	CARBON	2.2K	5%	1/4W (F590ES:Germany/F690ES:Germany)
R421	1-249-421-11	CARBON	2.2K	5%	1/4W (F590ES:Germany/F690ES:Germany)
R422	1-247-239-00	CARBON	910	5%	1/2W (F590ES:AEP, UK, Germany, F690ES)
R422	1-247-750-11	CARBON	680	5%	1/2W (F590ES:AE2)
R423	1-247-239-00	CARBON	910	5%	1/2W (F590ES:AEP, UK, Germany, F690ES)
R423	1-247-750-11	CARBON	680	5%	1/2W (F590ES:AE2)
R424	1-247-239-00	CARBON	910	5%	1/2W (F590ES:AEP, UK, Germany, F690ES)
R424	1-247-750-11	CARBON	680	5%	1/2W (F590ES:AE2)
R425	1-244-874-11	CARBON	1.1K	5%	1/2W (F590ES:AEP, UK, Germany, F690ES)
R425	1-247-751-11	CARBON	820	5%	1/2W (F590ES:AE2)
R426	1-244-874-11	CARBON	1.1K	5%	1/2W (F590ES:AEP, UK, Germany, F690ES)
R426	1-247-751-11	CARBON	820	5%	1/2W (F590ES:AE2)
R427	1-244-874-11	CARBON	1.1K	5%	1/2W (F590ES:AEP, UK, Germany, F690ES)
R427	1-247-751-11	CARBON	820	5%	1/2W (F590ES:AE2)
R430	1-249-421-11	CARBON	2.2K	5%	1/4W
R431	1-249-421-11	CARBON	2.2K	5%	1/4W
R455	1-247-706-11	CARBON	330	5%	1/4W (F590ES:AEP, AE2, UK/F690ES:AEP, AE2, UK)
R456	1-247-700-11	CARBON	100	5%	1/4W
R457	1-249-469-11	CARBON	100K	5%	1/4W
R458	1-249-469-11	CARBON	100K	5%	1/4W
R459	1-247-710-11	CARBON	560	5%	1/4W
R460	1-247-710-11	CARBON	560	5%	1/4W
R461	1-247-725-11	CARBON	10K	5%	1/4W
R462	1-247-700-11	CARBON	100	5%	1/4W
R463	1-260-661-11	CARBON	6.8	5%	1/4W
R465	1-247-700-11	CARBON	100	5%	1/4W (F590ES:AEP, AE2, UK/F690ES:AEP, AE2, UK)
R465	1-249-542-11	CARBON	390	5%	1/4W (F590ES:Germany/F690ES:Germany)
R466	1-246-545-00	CARBON	1.0M	5%	1/4W
R467	1-249-844-11	CARBON	56K	1%	1/2W
R468	1-249-818-11	CARBON	4.7K	1%	1/2W
R469	1-247-713-11	CARBON	1K	5%	1/4W
R470	1-249-421-11	CARBON	2.2K	5%	1/4W (F590ES:Germany/F690ES:Germany)
R471	1-249-421-11	CARBON	2.2K	5%	1/4W (F590ES:Germany/F690ES:Germany)

Ref. No.	Part No.	Description			Remark
		< SWITCH >			
S401	1-571-111-11	SWITCH, PUSH (1 KEY) (CARTRIDGE)			
*	1-644-006-11	H P BOARD	*****		
		< CAPACITOR >			
C322	1-162-282-31	CERAMIC	100PF	10%	50V (F590ES:Germany/F690ES:Germany)
C372	1-162-282-31	CERAMIC	100PF	10%	50V (F590ES:Germany/F690ES:Germany)
		< JACK >			
HP1	1-507-796-71	JACK (HEADPHONES)			
*	1-644-008-11	INPUT BOARD	*****		
		< CONNECTOR >			
* CS12	1-509-931-11	SOCKET, CONNECTOR			
CS14	1-562-087-00	SOCKET, CONNECTOR 4P			
		< PLUG >			
EH6	1-691-765-11	PLUG (MICRO CONNECTOR) 3P (F690ES)			
		< JACK >			
* PJ1	1-573-142-21	JACK, PIN 4P (TAPE 2) (F590ES)			
* PJ1	1-573-142-41	JACK, PIN 4P (TAPE 2) (F690ES)			
* PJ2	1-573-142-21	JACK, PIN 4P (DAT/TAPE 1) (F590ES)			
* PJ2	1-573-142-41	JACK, PIN 4P (DAT/TAPE 1) (F690ES)			
PJ3	1-568-978-21	JACK 6P (TUNER/CD/AUX)			
PJ5	1-573-141-11	JACK 2P (PRE OUT) (F690ES)			
		< RESISTOR >			
R101	1-246-545-00	CARBON	1.0M	5%	1/4W
R102	1-246-545-00	CARBON	1.0M	5%	1/4W
R103	1-246-545-00	CARBON	1.0M	5%	1/4W
R104	1-246-545-00	CARBON	1.0M	5%	1/4W
R105	1-246-545-00	CARBON	1.0M	5%	1/4W
R106	1-247-713-11	CARBON	1K	5%	1/4W
R107	1-247-713-11	CARBON	1K	5%	1/4W
R151	1-246-545-00	CARBON	1.0M	5%	1/4W
R152	1-246-545-00	CARBON	1.0M	5%	1/4W
R153	1-246-545-00	CARBON	1.0M	5%	1/4W

INPUT

INPUT J

MAIN

Ref. No.	Part No.	Description	Remark		
R154	1-246-545-00	CARBON	1.0M	5%	1/4W
R155	1-246-545-00	CARBON	1.0M	5%	1/4W
R156	1-247-713-11	CARBON	1K	5%	1/4W
R157	1-247-713-11	CARBON	1K	5%	1/4W
R330	1-247-255-00	CARBON	4.3K	5%	1/2W (F690ES)
R331	1-247-739-11	CARBON	100	5%	1/2W (F690ES)
R334	1-247-255-00	CARBON	4.3K	5%	1/2W (F690ES)
R380	1-247-255-00	CARBON	4.3K	5%	1/2W (F690ES)
R381	1-247-739-11	CARBON	100	5%	1/2W (F690ES)
R384	1-247-255-00	CARBON	4.3K	5%	1/2W (F690ES)

< SWITCH >

S102 1-571-115-11 SWITCH, SLIDE (REC OUT SELECTOR)

* 1-644-002-11 INPUT J BOARD

< CONPOSITION CIRCUIT BLOCK >

* CP10 1-569-418-11 PIN, CONNECTOR 13P

* CP16 1-508-745-00 CONNECTOR PIN

* A-4347-828-A MAIN BOARD, COMPLETE (F690ES)

* A-4347-840-A MAIN BOARD, COMPLETE (F590ES)

< CAPACITOR >

C312	1-126-051-11	ELECT	47uF	20%	50V
C313	1-102-233-00	CERAMIC	33PF	10%	500V(F590ES)
C314	1-102-233-00	CERAMIC	33PF	10%	500V(F590ES)
C314	1-107-159-00	MICA	33PF	5%	500V(F690ES)

C315	1-136-161-00	FILM	0.047uF	5%	50V
C316	1-136-161-00	FILM	0.047uF	5%	50V
C317	1-107-026-00	MICA	5.1PF		500V(F690ES)
C362	1-126-051-11	ELECT	47uF	20%	50V

C363	1-102-233-00	CERAMIC	33PF	10%	500V(F590ES)
C363	1-107-159-00	MICA	33PF	5%	500V(F690ES)
C364	1-102-233-00	CERAMIC	33PF	10%	500V(F590ES)
C364	1-107-159-00	MICA	33PF	5%	500V(F690ES)

C365	1-136-161-00	FILM	0.047uF	5%	50V
C366	1-136-161-00	FILM	0.047uF	5%	50V
C501	1-125-695-11	ELECT	12000uF	20%	63V
C502	1-125-695-11	ELECT	12000uF	20%	63V
C503	1-125-694-11	ELECT	5600uF	20%	63V
C504	1-125-694-11	ELECT	5600uF	20%	63V

Ref. No.	Part No.	Description	Remark		
C508	1-136-880-11	FILM	2.2uF	10%	160V(F690ES)
C508	1-136-962-11	FILM	0.47uF	10%	160V(F590ES)
C509	1-126-069-11	ELECT	1uF	20%	100V
C510	1-126-064-11	ELECT	220uF	20%	63V(F590ES)
C510	1-126-065-81	ELECT	330uF	20%	63V(F690ES)
C517	1-126-023-11	ELECT	100uF	20%	25V
C518	1-130-487-00	MYLAR	0.022uF	5%	50V
C519	1-126-023-11	ELECT	100uF	20%	25V
C520	1-130-471-00	MYLAR	0.001uF	5%	50V

< CONPOSITION CIRCUIT BLOCK >

* CP8 1-560-531-00 PIN, CONNECTOR 5P

< CONNECTOR >

* CS8 1-562-334-00 SOCKET, CONNECTOR 10P

< DIODE >

D307	8-719-987-63	DIODE	1N4148M
D308	8-719-987-63	DIODE	1N4148M
D309	8-719-987-63	DIODE	1N4148M
D357	8-719-987-63	DIODE	1N4148M
D358	8-719-987-63	DIODE	1N4148M

D359	8-719-987-63	DIODE	1N4148M
D501	8-719-230-02	DIODE	30DF2
D502	8-719-230-02	DIODE	30DF2
D503	8-719-230-02	DIODE	30DF2
D504	8-719-230-02	DIODE	30DF2

< IC >

IC501 8-759-111-68 IC uPC1237HA

< TRANSISTOR >

Q309	8-729-203-45	TRANSISTOR	2SC3423-0
Q310	8-729-107-53	TRANSISTOR	2SC2275A
Q311	8-729-141-10	TRANSISTOR	2SA95A-QP
Q312	8-729-015-30	TRANSISTOR	2SK1530-Y
Q313	8-729-015-31	TRANSISTOR	2SJ201-Y
Q314	8-729-140-82	TRANSISTOR	2SA988-PAFAEA
Q315	8-729-015-30	TRANSISTOR	2SK1530-Y
Q359	8-729-203-45	TRANSISTOR	2SC3423-0

MAIN

RYJ

SELECTOR

Ref. No.	Part No.	Description	Remark
Q360	8-729-107-53	TRANSISTOR	2SC2275A
Q361	8-729-141-10	TRANSISTOR	2SA985A-QP
Q362	8-729-015-30	TRANSISTOR	2SK1530-Y
Q363	8-729-015-31	TRANSISTOR	2SJ201-Y
Q364	8-729-140-82	TRANSISTOR	2SA988-PAFAEA

< RESISTOR >

R314	1-247-713-11	CARBON	1K	5%	1/4W
R315	1-247-696-11	CARBON	47	5%	1/4W
△R316	1-212-990-00	FUSIBLE	220	5%	1/2W F
△R317	1-212-974-00	FUSIBLE	47	5%	1/2W F
△R318	1-212-974-00	FUSIBLE	47	5%	1/2W F

R319	1-217-151-00	RES, METAL PLATE	0.22		
R320	1-217-151-00	RES, METAL PLATE	0.22		
R321	1-247-721-11	CARBON	4.7K	5%	1/4W
R322	1-249-460-11	CARBON	15K	5%	1/4W
△R323	1-212-962-00	FUSIBLE	15	5%	1/2W F

△R324	1-212-962-00	FUSIBLE	15	5%	1/2W F
R325	1-247-891-00	CARBON	330K	5%	1/4W
R326	1-247-713-11	CARBON	1K	5%	1/4W
R327	1-247-696-11	CARBON	47	5%	1/4W

△R328	1-212-990-00	FUSIBLE	220	5%	1/2W F
△R329	1-212-974-00	FUSIBLE	47	5%	1/2W F
△R330	1-212-974-00	FUSIBLE	47	5%	1/2W F
R329	1-217-151-00	RES, METAL PLATE	0.22		
R330	1-217-151-00	RES, METAL PLATE	0.22		

R371	1-247-721-11	CARBON	4.7K	5%	1/4W
R372	1-249-460-11	CARBON	15K	5%	1/4W
△R373	1-212-962-00	FUSIBLE	15	5%	1/2W F
△R374	1-212-962-00	FUSIBLE	15	5%	1/2W F
R375	1-247-891-00	CARBON	330K	5%	1/4W

△R501	1-212-849-00	FUSIBLE	4.7	5%	1/4W F
R521	1-249-461-11	CARBON	18K	5%	1/4W
R522	1-247-881-00	CARBON	120K	5%	1/4W
R523	1-247-725-11	CARBON	10K	5%	1/4W
R524	1-247-887-00	CARBON	220K	5%	1/4W
R527	1-249-462-11	CARBON	22K	5%	1/4W

< VARIABLE RESISTOR >

RT301	1-237-455-11	RES, ADJ, CARBON	500 (L CH)	BIAS
RT351	1-237-455-11	RES, ADJ, CARBON	500 (R CH)	BIAS

< CONNECTOR >

* VH1	1-564-241-00	PIN, CONNECTOR (B4P-VH)	4P		
VH2	1-564-320-00	PIN, CONNECTOR (B2P-VH)	2P		
* VH3	1-564-241-00	PIN, CONNECTOR (B4P-VH)	4P	(F690ES)	
* VH4	1-564-241-00	PIN, CONNECTOR (B4P-VH)	4P		

Ref. No.	Part No.	Description	Remark
*	1-643-999-11	RYJ BOARD	*****
			< COMPOSITION CIRCUIT BLOCK >

* CP14 1-565-647-11 PIN, CONNECTOR 14P

< CONNECTOR >

* CS9 1-562-573-11 SOCKET, CONNECTOR 8P

* EH3 1-564-505-11 PLUG, CONNECTOR 2P

* 1-644-004-11 SELECTOR BOARD

< CAPACITOR >

C814	1-161-379-00	CERAMIC	0.01uF	20%	25V
C815	1-162-294-31	CERAMIC	0.001uF	10%	50V
C817	1-161-379-00	CERAMIC	0.01uF	20%	25V
C818	1-162-290-31	CERAMIC	470PF	10%	50V

< CONNECTOR >

CS2 1-695-014-11 SOCKET, CONNECTOR 8P

CS3 1-695-014-11 SOCKET, CONNECTOR 8P

< DIODE >

D819	8-719-313-40	LED	SEL1516W (POWER)
D821	8-719-303-02	DIODE	SEL2510C-D (PHONO)
D822	8-719-303-02	DIODE	SEL2510C-D (TUNER)
D823	8-719-303-02	DIODE	SEL2510C-D (CD)
D824	8-719-303-02	DIODE	SEL2510C-D (AUX)
D825	8-719-303-02	DIODE	SEL2510C-D (TAPE 2)
D826	8-719-303-02	DIODE	SEL2510C-D (DAT/TAPE 1)
D827	8-719-301-49	LED	SEL2810A (MUTING)
D828	8-719-301-49	LED	SEL2810A (SOURCE DIRECT)

< IC >

IC9 8-749-923-43 IC GP1U57XB (REMOTE SENSOR)

IC807 8-759-635-31 IC M50253P

IC808 8-719-902-56 DIODE PC817 (PHOTO COUPLER)

< RESISTOR >

R854	1-249-409-11	CARBON	220	5%	1/4W
R856	1-249-404-00	CARBON	82	5%	1/4W
R857	1-249-405-11	CARBON	100	5%	1/4W
R858	1-249-405-11	CARBON	100	5%	1/4W

Note: The components identified by mark **△** or dotted line with mark **△** are critical for safety. Replace only with part number specified.

SELECTOR

SP

Ref. No.	Part No.	Description	Remark	Ref. No.	Part No.	Description	Remark				
< SWITCH >											
S801	1-554-303-21	SWITCH, TACTILE (PHONO)		* L301	1-422-009-13	COIL, AIR-CORE					
S802	1-554-303-21	SWITCH, TACTILE (TUNER)		* L351	1-422-009-13	COIL, AIR-CORE					
S803	1-554-303-21	SWITCH, TACTILE (CD)		< COIL >							
S804	1-554-303-21	SWITCH, TACTILE (AUX)		< RESISTOR >							
S805	1-554-303-21	SWITCH, TACTILE (TAPE 2)		R328	1-247-727-11	CARBON	10 5% 1/2W				
S806	1-554-303-21	SWITCH, TACTILE (DAT/TAPE 1)		R332	1-247-727-11	CARBON	10 5% 1/2W (F590ES:Germany/F690ES:Germany)				

*	1-644-007-11	SP BOARD		R333	1-247-727-11	CARBON	10 5% 1/2W (F590ES:Germany/F690ES:Germany)				

1-533-183-11 HOLDER, FUSE											
< CAPACITOR >											
C319	1-162-290-31	CERAMIC 470PF 10% 50V	(F590ES:Germany/F690ES:Germany)	R335	1-247-700-11	CARBON	100 5% 1/4W (F690ES:Germany)				
C320	1-136-157-11	FILM 0.022uF 5% 50V	(F590ES:Germany/F690ES:Germany)	R378	1-247-727-11	CARBON	10 5% 1/2W				
C321	1-136-157-11	FILM 0.022uF 5% 50V	(F590ES:Germany/F690ES:Germany)	R382	1-247-727-11	CARBON	10 5% 1/2W (F590ES:Germany/F690ES:Germany)				
C369	1-162-290-31	CERAMIC 470PF 10% 50V	(F590ES:Germany/F690ES:Germany)	R383	1-247-727-11	CARBON	10 5% 1/2W (F590ES:Germany/F690ES:Germany)				
C370	1-136-157-11	FILM 0.022uF 5% 50V	(F590ES:Germany/F690ES:Germany)	< RELAY >							
C371	1-136-157-11	FILM 0.022uF 5% 50V	(F590ES:Germany/F690ES:Germany)	RY503	1-515-676-11	RELAY (SP L)					
C424	1-161-379-00	CERAMIC 0.01uF 20% 25V	(F690ES:Germany)	RY504	1-515-676-11	RELAY (SP R)					
C506	1-125-695-11	ELECT 12000uF 20% 63V (F690ES)		< SWITCH >							
C507	1-125-695-11	ELECT 12000uF 20% 63V (F690ES)		S601	1-554-920-11	SWITCH, PUSH (AC POWER) (1 KEY)					
C601	1-161-741-00	CERAMIC 0.001uF 10% 400V		< CONNECTOR >							
< LEAD PIN >											
CL2	4-352-844-01	PIN, LEAD, COATING		SC1	1-566-213-11	PIN, CONNECTOR 4P (TUNER CONTROL OUT)					
< CONPOSITION CIRCUIT BLOCK >											
* CP17	1-566-878-11	PIN, CONNECTOR (PC BOARD) 8P		< TERMINAL >							
< DIODE >											
D515	8-719-987-63	DIODE 1N4148M		TM900	1-537-227-11	TERMINAL BOARD (SP)					
D516	8-719-987-63	DIODE 1N4148M		(F590ES:AE2/F690ES:AE2)							
< PLUG >				TM900 1-537-228-11 TERMINAL BOARD (SP)							
EH5	1-691-765-11	PLUG (MICRO CONNECTOR) 3P (F690ES)		(F590ES:Germany/F690ES:Germany)							
< FUSE >				TM900 1-537-235-11 TERMINAL BOARD (SP)							
*****				(F590ES:AEP, UK/F690ES:AEP, UK)							
△F601	1-532-350-11	FUSE TIME LAG 4A 250V (T4AL)		< CONNECTOR >							

Note: The components identified by mark △ or dotted line with mark △ are critical for safety. Replace only with part number specified.											

VOL

VOL LED

Ref. No.	Part No.	Description			Remark	
*	1-644-001-11	VOL BOARD	*****			
< CAPACITOR >						
C102 1-104-278-11 POLYSTYRENE 100PF 5% 50V (F690ES:Germany)						
C102	1-110-335-11 MYLAR	100PF	5%	50V	(F690ES:Germany)	
C103	1-104-278-11 POLYSTYRENE	100PF	5%	50V	(F690ES:Germany)	
C103	1-110-335-11 MYLAR	100PF	5%	50V	(F690ES:Germany)	
C152	1-104-278-11 POLYSTYRENE	100PF	5%	50V	(F690ES:Germany)	
C152	1-110-335-11 MYLAR	100PF	5%	50V	(F690ES:Germany)	
C701	1-126-163-11 ELECT	4.7uF	20%	50V		
C702	1-126-163-11 ELECT	4.7uF	20%	50V		
C703	1-126-163-11 ELECT	4.7uF	20%	50V		
C704	1-126-163-11 ELECT	4.7uF	20%	50V		
< LEAD PIN >						
CL1	4-352-844-01	PIN, LEAD, COATING	< CONPOSITION CIRCUIT BLOCK >			
* CP3	1-568-320-11	PLUG, CONNECTOR 8P	< DIODE >			
* CP4	1-568-320-11	PLUG, CONNECTOR 8P	* 1-644-005-11 VOL LED BOARD			
* CP5	1-568-320-11	PLUG, CONNECTOR 8P	*****			
< CONNECTOR BOARD >						
* CS1	1-565-489-11	CONNECTOR, BOARD TO BOARD 13P	< DIODE >			
< DIODE >						
D701	8-719-987-63	DIODE 1N4148M	*****			
D702	8-719-987-63	DIODE 1N4148M	MISCELLANEOUS			
< CONNECTOR >						
* EH1	1-564-506-11	PLUG, CONNECTOR 3P	*****			
< JACK >						
PJ4	1-566-883-31	JACK, PIN 6P (DIRECT/ADAPTOR) (F690ES)	57 1-692-138-11 SWITCH, ROTARY (REMOTE TYPE) (FUNCTION)			
* PJ4	1-566-883-51	JACK, PIN 6P (DIRECT/ADAPTOR) (F690ES)	△113 1-559-272-21 CORD, POWER (F690ES:UK)			
< RESISTOR >						
R108	1-246-545-00	CARBON 1.0M 5% 1/4W	△113 1-574-804-11 CORD, POWER (F590ES:UK)			
R109	1-246-545-00	CARBON 1.0M 5% 1/4W	△114 1-575-953-11 CORD, POWER (F690ES:AEP, AE2, Germany)			
R110	1-249-778-91	CARBON 100 1% 1/2W	△115 1-696-169-11 CORD, POWER (AEP) (F590ES:AEP, AE2, Germany)			
R111	1-249-842-91	CARBON 47K 1% 1/2W	126 1-573-905-11 PLUG, JAMPER			
R158	1-246-545-00	CARBON 1.0M 5% 1/4W	△T4A 1-450-916-11 TRANSFORMER, POWER (F590ES:AE2)			

Ref. No.	Part No.	Description			Remark	
R159	1-246-545-00	CARBON 1.0M 5% 1/4W				
R160	1-249-778-91	CARBON 100 1% 1/2W				
R161	1-249-842-91	CARBON 47K 1% 1/2W				
R211	1-249-842-91	CARBON 47K 1% 1/2W				
R261	1-249-842-91	CARBON 47K 1% 1/2W				
< VARIABLE RESISTOR >						
RV204	1-241-908-11	RES, VAR, CARBON 120K/120K (WITH MOTOR) (ATTENUATOR)				
< RELAY >						
RY701	1-515-622-11	RELAY (MUTING)				
RY702	1-515-804-11	RELAY (DIRECT/ADAPTOR)				
< SWITCH >						
S101	1-692-142-11	SWITCH, ROTARY (WITH MOTOR) (FUNCTION)				
S202	1-692-140-11	SWITCH, PUSH (1 KEY) (SOURCE DIRECT)				
S208	1-572-126-11	SWITCH, PUSH (1 KEY) (SOURCE DIRECT)				

* 1-644-005-11 VOL LED BOARD						

< DIODE >						
D520	8-719-303-02	DIODE SEL2510C-D (ATTENUATOR)				

MISCELLANEOUS						

57	1-692-138-11	SWITCH, ROTARY (REMOTE TYPE) (FUNCTION)				
△113	1-559-272-21	CORD, POWER (F690ES:UK)				
△113	1-574-804-11	CORD, POWER (F590ES:UK)				
△114	1-575-953-11	CORD, POWER (F690ES:AEP, AE2, Germany)				
△115	1-696-169-11	CORD, POWER (AEP) (F590ES:AEP, AE2, Germany)				
126	1-573-905-11	PLUG, JAMPER				
△T4A	1-450-916-11	TRANSFORMER, POWER (F590ES:AE2)				
△T4A	1-450-918-11	TRANSFORMER, POWER (F690ES:AEP, Germany)				
△T4A	1-450-919-11	TRANSFORMER, POWER (F590ES:AEP, Germany/F690ES:AE2)				
△T4A	1-450-920-11	TRANSFORMER, POWER (F690ES:UK)				
△T4A	1-450-921-11	TRANSFORMER, POWER (F590ES:UK)				

Note: The components identified by mark **△** or dotted line with mark **△** are critical for safety.
Replace only with part number specified.

Ref. No.	Part No.	Description	Remark
ACCESSORIES & PACKING MATERIALS			

1-465-801-11	REMOTE COMMANDER (RM-S703) (F690ES)		
1-693-108-11	REMOTE COMMANDER (RM-S702) (F590ES)		
2-181-754-01	COVER, BATTERY (F590ES)		
3-755-257-11	MANUAL, INSTRUCTION (ENGLISH//FRENCH// SPANISH/PORTUGUESE)		
	(F590ES:AEP, AE2, UK/F690ES:AEP, AE2, UK)		
3-755-257-41	MANUAL, INSTRUCTION (GERMAN/DUTCH// SWEDISH/ITALIAN)		
	(F590ES:AEP, AE2, Germany/F690ES:AEP, AE2, Germany)		
*	4-927-854-01	CUSHION	
*	4-951-280-01	INDIVIDUAL CARTON (F690ES)	
*	4-951-281-01	INDIVIDUAL CARTON (F590ES)	

HARDWARE LIST

#1	7-685-234-19	SCREW +KTP 2.6X8 TYPE2NON-SLIT
#2	7-682-547-09	SCREW +BVTT 3X6 (S)
#3	7-685-647-79	SCREW +BVTP 3X10 TYPE2 N-S
#4	7-685-650-79	SCREW +BVTP 3X16 TYPE2 SLIT
#5	7-682-548-09	SCREW (3X8)
#6	7-682-565-09	SCREW +B 4X16
#7	7-684-024-04	N 4, TYPE 2
#8	7-685-649-79	SCREW +BVTP 3X14 TYPE2 IT-3
#9	7-685-876-09	SCREW +BVTT 3X16 (S)
#10	7-621-849-00	SCREW, TAPPING (F590ES:Germany/F690ES:Germany)
#11	7-685-648-79	SCREW +BVTP 3X12 TYPE2 N-S
#12	7-683-255-58	SET SCREW 5X6 HEXAGON SOCKET

Note :

There are two type of AEP models which are depend on countries.

AE 2 model : Model for North European countries.

AEP model : Model for other European countries.

